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Journal of Occupational Medicine

Work Loss Due to Illness in Selected Occupations and Industries

Philip E. Enterline, Ph.D., Washington, D. C.

THIS IS a report on absence from work because of illness, for selected occupations, industries, types of employment, and types of manufacturing, as revealed by the monthly survey of the labor force during the period July, 1959 to June, 1960. Presented here are previously unpublished data for the entire United States from the files of the Bureau of Labor Statistics, U. S. Department of Labor. They were collected for the Bureau of Labor Statistics by the U. S. Bureau of the Census in connection with the establishment of reasons why some fully employed workers did not work at all the week preceding the monthly interview or worked only part of that week. One of the reasons recorded and tabulated is "own illness." The exact wording of the questions upon which these data are based appears in the Appendix.

Previous reports on work loss due to illness do not contain the kind of detail nor do they represent the coverage available from the monthly survey of the labor force. During the 1920's, Brundage[1-3] studied absenteeism due to sickness by occupation from records of certain industries. In 1932, Britten[4] analyzed rates of physical impairments by occupation based upon medical examinations of male life insurance policy holders, and in 1938 Gafafer and Frasier[5] reported on the frequency of absence because of illness by occupation in a public utility. Some reports on illness by occupation have been made on the basis of a household survey conducted during the winter of 1935-1936 in 83 cities of the United States[6] and household illness surveys conducted in Baltimore, Md.,[7] in 1941-1943, Hagerstown, Md.,[8] in 1955, and California[9] in 1954-1955. Mortality tabulations by occupation have been published for all or part of the United States for 1890, 1900, 1930, and 1950.[10-13]

In a previous publication,[14] it was concluded that illness measured by the monthly survey of the labor force apparently responds to the same factors as other measures of illness respond. Estimates derived from labor force data as to absenteeism on an average workday due to illness, for example, are similar to those reported in the U. S. National Health Survey. Fig. 1 brings up to date a previously published comparison between labor force survey and National Health Survey data.[14] Starting in 1958, these series have been quite similar.

The period for which data are presented in this report (July, 1959 to June, 1960) is not entirely representative of other years. Fig. 1 shows that in the first quarter of 1960 the illness rate was relatively high. While illness rates presented here are, therefore, somewhat higher than would ordinarily be expected, it is not believed that the comparisons presented are greatly affected.

Only data regarding illness lasting a workweek or more are available from the files of the Bureau of Labor Statistics for the labor force groupings presented here (i.e., by occupation, industry, etc.). In the following, therefore, the illness referred to is of moderate severity, resulting in the loss of a full work-

The author is Chief, Biometrics and Social Studies, Division of Occupational Health, U. S. Public Health Service.

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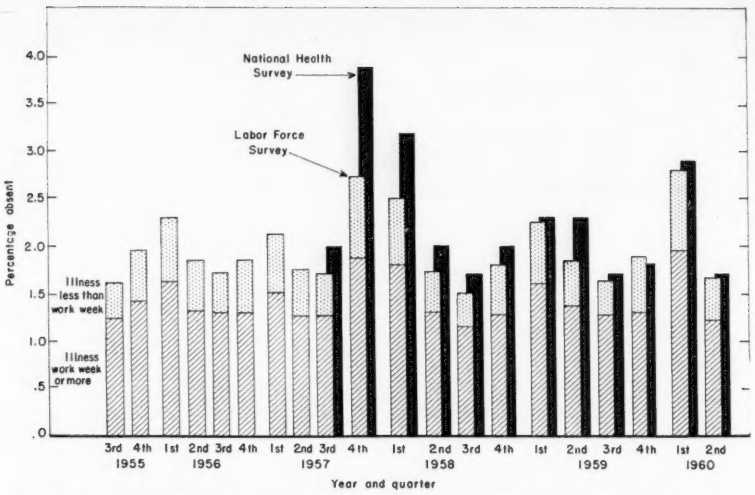


Fig. 1—Percentage of working population absent on an average workday, because of illness, by quarter, July, 1955 to June, 1960. Civilian population, United States.

week. As Fig. 1 shows, these illnesses make up most of the illnesses resulting in absence from work on an average workday and affect well over 1% of the working population.

The data available for this report relate only to employed civilian wage and salary workers. Comparable tabulations have not been made for self-employed workers and unpaid family workers. These three categories make up the total employed civilian labor force. During the period covered by this study, there were about 55,000,000 employed civilian wage and salary workers and 10,000,000 self-employed workers and unpaid family workers in the United States—or a total of about 65,000,000 employed civilian workers.

Illness by Occupation

Table I shows mean ages and crude and age-adjusted illness rates by occupation and sex for the 55,000,000 fully employed civilian wage and salary workers in the United States.* Fig. 2 shows age-adjusted rates by occupation and sex. Because of sampling variability, rates are not shown here or in the tables which follow for groupings having fewer than 50,000 workers. Fig. 2 shows the standard error (an estimate of sampling variability) of the rates presented. Standard errors are also shown in figures relating to industry and type of manufacturing. Illness rates are averages of 12 monthly percentages of fully employed civilian wage and salary workers who did not work the entire week preceding the monthly labor force interview because of illness. The manner in which standard errors were calculated, the source of data, and the procedures used for age adjustments are described in the

*See Reference 16 for a detailed list of the occupations included in the occupational categories shown in Table I. This also provides an estimate of the frequency with which specific detailed occupational classifications occur within these groupings.

Table I—Number of Workers, Mean Age, and Illness Rates on an Average Workday, by Occupation and Sex, Civilian Wage and Salary Workers, United States, July, 1959, to June, 1960*

Occupation Group	Male				Female			
	Number of Workers (Thousands)	Mean Age† (Years)	Illness Rate per 1,000		Number of Workers (Thousands)	Mean Age† (Years)	Illness Rate per 1,000	
			Crude	Age-Adjusted			Crude	Age-Adjusted
All	36,008	41.3	13.2	13.3	19,255	40.3	15.6	15.9
Professional, technical, and kindred workers	3,983	40.1	7.4	7.7	2,448	41.0	11.1	11.1
Farmers and farm managers	47	....	....	....	1	....	....	....
Managers, officials, and proprietors, except farm	2,931	46.3	8.0	7.5	493	48.6	22.8	20.5
Clerical and kindred workers	3,062	39.0	14.1	14.7	6,256	36.4	11.5	12.4
Sales workers	2,375	39.2	9.7	10.1	1,448	41.8	18.6	18.4
Craftsmen, foremen, and kindred workers	7,784	42.4	15.0	15.0	200	45.5	25.0	23.5
Operatives and kindred workers	8,491	38.4	15.6	16.5	3,226	40.9	25.7	26.5
Private household workers	42	....	....	....	2,090	42.0	11.6	11.3
Service workers, except private household	2,621	42.7	15.5	15.0	2,742	41.4	16.8	16.8
Farm laborers and foremen	1,157	32.7	6.9	7.7	264	40.8	5.5	5.5
Laborers, except farm and mine	3,513	37.9	16.3	17.1	86	41.0	27.7	27.7

*Illness lasting a workweek or more
†Jan.-Dec. 1959

Appendix. Concepts and data collection methods used in the labor force survey are more fully explained elsewhere.[15]

Both crude and age-adjusted rates vary considerably by occupational group. Rates vary more for females than for males. Generally, illness rates are lowest in white-collar and higher-paid occupations. An exception is "farm laborers and foremen," for which a low illness rate was observed. Females have higher illness rates than males in every occupational grouping for which data are shown except clerical and kindred workers and farm laborers and foremen.

Generally, these data agree with other published material which suggests an inverse relationship between illness and economic status and agree with other recent data on illness by occupation.[9] Correspondence with 1950 mortality data by occupation is very good.[13]

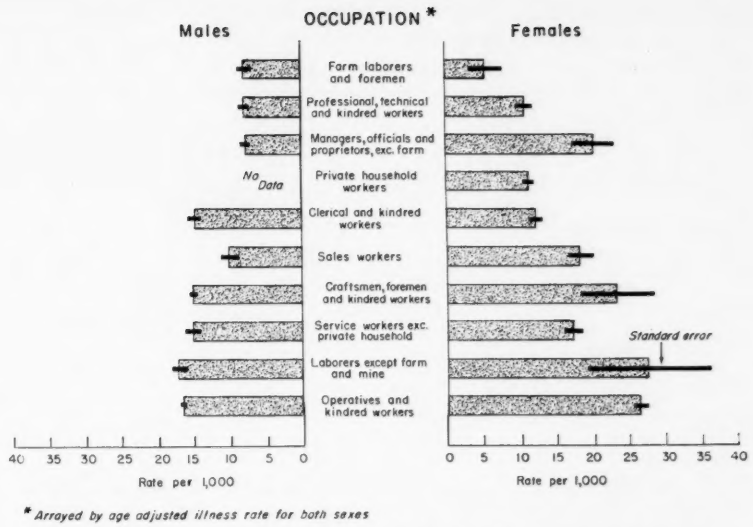

OCCUPATION *
Males
Females
Farm laborers and foremen
Professional, technical and kindred workers
Managers, officials and proprietors, exc. farm
No Data
Private household workers
Clerical and kindred workers
Sales workers
Craftsmen, foremen and kindred workers
Service workers exc. private household
Laborers except farm and mine
Operatives and kindred workers
Standard error
40 35 30 25 20 15 10 5 0
Rate per 1,000
0 5 10 15 20 25 30 35 40
Rate per 1,000
* Arrayed by age adjusted illness rate for both sexes

Fig. 2—Illness rates on an average workday, by occupation and sex. Civilian wage and salary workers. United States, July, 1959, to June, 1960. (Illness lasting a workweek or more. Rates are age-adjusted.)

Illness by Type of Employment

Of the 55,000,000 civilian wage and salary workers, an estimated 1,687,000 are employed in agriculture, 7,765,000 are employed by government, and 45,812,000 are employed in private nonagricultural industries. Table II shows mean ages and illness rates by sex for these three types of employment. Illness rates are lowest among agricultural workers for both males and females. The highest rate for males is among government workers and for females among private nonagricultural workers. Male government employees have higher illness rates than female government employees. Among government employees, the lowest illness rate is for persons in educational services.

Illness by Industry

Illness rates by industry are shown in Table III and Fig. 3 for 46,000,000 private (i.e., nongovernmental) nonagricultural wage and salary workers. Illness rates vary considerably, with crude rates for males ranging from 4.5 per 1,000 workers in private households to 27.0 per 1,000 workers in the railroad industry and for females from 5.1 per 1,000 workers in private educational services to 22.5 per 1,000 workers in manufacturing. Age adjustment removes little of the variation in rates. Male illness rates exceed female rates for workers in construction, railroad, other trans-

Table II—Number of Workers, Mean Age, and Illness Rates on an Average Workday, by Type of Employment and Sex, Civilian Wage and Salary Workers, United States, July, 1959, to June, 1960*

Type of Employment	Male				Female			
	Number of Workers (Thousands)	Mean Age (Years)	Illness Rate per 1,000		Number of Workers (Thousands)	Mean Age (Years)	Illness Rate per 1,000	
			Crude	Age-Adjusted			Crude	Age-Adjusted
All wage and salary workers	36,008	40.6†	13.2	13.3	19,255	40.3†	15.6	15.9
Agriculture	1,393	36.6†	7.4	7.8	293	36.2†	7.1	7.7
Government	4,730	42.1‡	16.0	16.0	3,034	39.5‡	12.7	13.2
Public administration	2,283	41.9‡	16.2	16.4	870	38.5‡	16.1	17.1
Educational services	925	41.3‡	10.6	10.7	1,514	40.6‡	9.4	9.6
All other government	1,521	42.9‡	18.9	18.7	650	38.1‡	15.2	16.1
Private nonagriculture	29,885	40.8†	13.0	13.3	15,927	39.9†	16.3	16.6

*Illness lasting a workweek or more
†Jan.-Dec. 1959
‡1950 Census

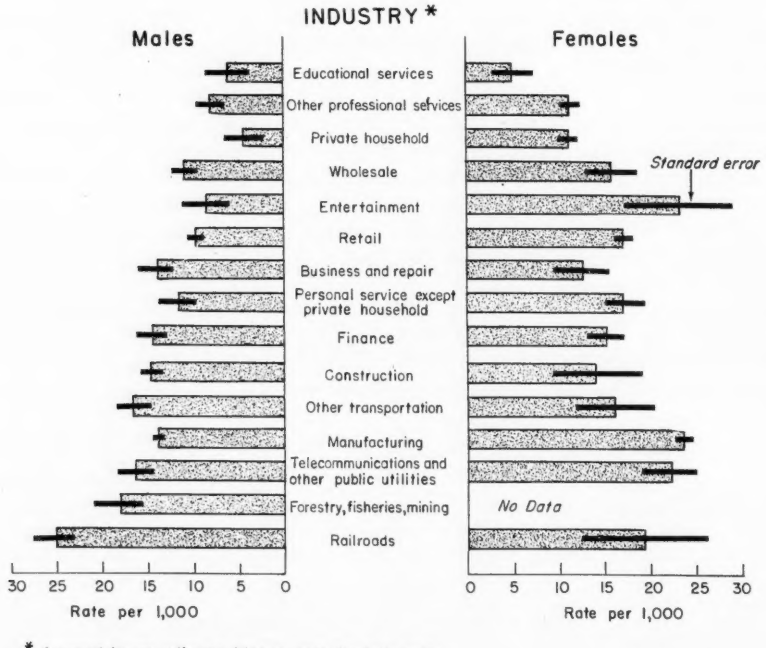
portation industries, finance and business, repair and educational services.

Data published by the Railroad Retirement Board on railroad workers receiving sickness benefits tend to confirm the relatively high illness rate for railroad workers shown in Table III. During the 1957-1958 sickness benefit year, the latest period for which data are published, it can be estimated that 2.2% of qualified males and 2.1% of qualified females were receiving sickness benefits, or were being given waiting-period credits,* on an average workday.[17] This can be compared with 2.7% of males and 2.0% of females in the railroad industry ill on an average workday shown in Table III.

Table III—Mean Age, and Illness Rates on an Average Workday, by Industry and Sex, Private Civilian Wage and Salary Workers, United States, July 1959-June 1960*

Industry	Male			Female		
	Mean Age† (Years)	Illness Rate per 1,000 Crude	Illness Rate per 1,000 Age-Adjusted	Mean Age† (Years)	Illness Rate per 1,000 Crude	Illness Rate per 1,000 Age-Adjusted
All private nonagricultural industries	40.8	13.0	13.3	39.9	16.3	16.6
Forestry, fisheries, mining	42.0	17.9	18.1	....	....	....
Construction	40.7	14.2	14.6	39.5	13.3	13.8
Manufacturing	40.3	13.5	13.9	39.0	22.5	23.6
Railroads	47.0	27.0	25.1	43.9	20.1	19.3
Other transportation	41.1	16.3	16.6	35.9	14.5	16.0
Telecommunications and other public utilities	40.2	15.8	16.4	34.3	20.1	22.3
Wholesale	41.3	10.5	10.7	38.4	14.9	15.8
Retail	39.2	9.2	9.5	40.6	16.6	16.8
Finance	44.3	15.0	14.4	36.9	14.2	15.1
Business and repair	40.8	13.5	13.8	39.7	12.1	12.6
Private household	40.8	4.5	4.3	42.4	11.6	11.1
Personal services, except private households	44.0	12.1	11.6	43.0	17.1	16.8
Entertainment	37.6	8.1	8.4	36.9	21.8	23.3
Educational services	40.9	5.9	6.0	42.1	5.1	5.0
Other professional services	43.7	8.0	7.8	40.2	10.9	11.1

*Illness lasting a workweek or more
†Jan.-Dec. 1959



* *Arrayed by age adjusted illness rate for both sexes*

Fig. 3—Illness rates on an average workday, by industry and sex. Private civilian wage and salary workers. United States, July, 1959 to June, 1960. (Illness lasting a workweek or more. Rates are age-adjusted.)

Some data are available which also tend to confirm the above average illness rate for manufacturing shown in Table III. From a study of plant records on 149,000 workers in 246 manufacturing plants in 1947, it can be estimated that 1.6% of workers (males and females) were absent on an average workday due to illness lasting a workweek or longer.[18]† Combining data for males and females shown in Table III, it can be also estimated that, on the basis of the labor force household survey, about 1.6% of workers in manufacturing were absent on an average workday because of illness lasting a workweek or longer.

Illness by Type of Manufacturing

Table IV and Fig. 4 show illness rates by type of manufacturing. Illness rates are somewhat more

*A seven-day waiting period is required for sickness benefits.

†In that study, about 60% of all days lost involved illness lasting five days or more. This was used in deriving the 1.6%. Workdays were estimated as 260 per year.

uniform within the manufacturing industry than among the industries shown in Table III. Within the manufacturing industry, the highest illness rates are about three times the lowest for both males and females. For females, the high illness rate for manufacturing as a whole generally prevails throughout the manufacturing industry. Only in primary metals is the female rate exceeded by the male rate. In automobile manufacturing, 4.3% of the female workers are absent on an average workday with an illness lasting a week or more. Illness rates for this type of manufacturing are also high for males —not so high, however, as for males in the railroad industry (Table III).

By occupation, illness rates generally are lowest in white-collar and higher-paid occupations. Females have higher illness rates than males in every occupational grouping except

Table IV—Mean Age, and Illness Rates on an Average Workday, by Type of Manufacturing and Sex, Private Civilian Wage and Salary Workers, in Manufacturing, United States, July 1959-June 1960*

Type of Manufacturing	Male			Female		
	Mean Age† (Years)	Illness Rate per 1,000		Mean Age† (Years)	Illness Rate per 1,000	
		Crude	Age-Adjusted		Crude	Age-Adjusted
All	40.3	13.5	13.9	39.0	22.5	23.6
Durable goods	40.4	14.6	15.0	37.6	24.5	26.5
Lumber	38.2	12.8	13.6	....	....	....
Furniture	38.8	18.3	19.2	36.1	17.4	19.5
Stone, clay products	39.6	7.9	8.2	33.9	21.7	24.5
Primary metals	40.8	16.5	17.0	34.5	12.5	14.3
Fabricated metals	39.6	14.9	16.2	34.3	25.7	29.0
Machinery, except electrical	40.4	15.4	15.9	34.2	15.8	18.0
Electrical machinery	38.1	8.7	9.3	33.3	26.2	30.7
Automobiles	39.5	20.2	21.2	34.6	38.3	43.7
Other transportation equipment	40.0	12.8	13.4	35.0	16.6	18.8
Instruments	38.9	12.3	12.9	34.3	35.1	39.7
Other durables	39.1	24.7	25.7	35.1	36.8	40.8
Nondurable goods	40.0	11.6	11.9	39.9	21.2	22.0
Food and kindred	38.8	14.4	15.3	35.8	25.1	27.9
Textile mill products	39.6	11.9	12.4	36.7	19.2	21.1
Apparel	41.5	10.7	10.7	37.3	21.2	22.9
Printing and publishing	36.9	8.6	9.2	36.2	14.9	16.2
Chemicals and allied products	39.1	12.6	13.4	34.2	19.1	21.8
Other nondurables	40.0	11.0	11.4	35.7	26.4	29.3

*Illness lasting a workweek or more
†1950 Census

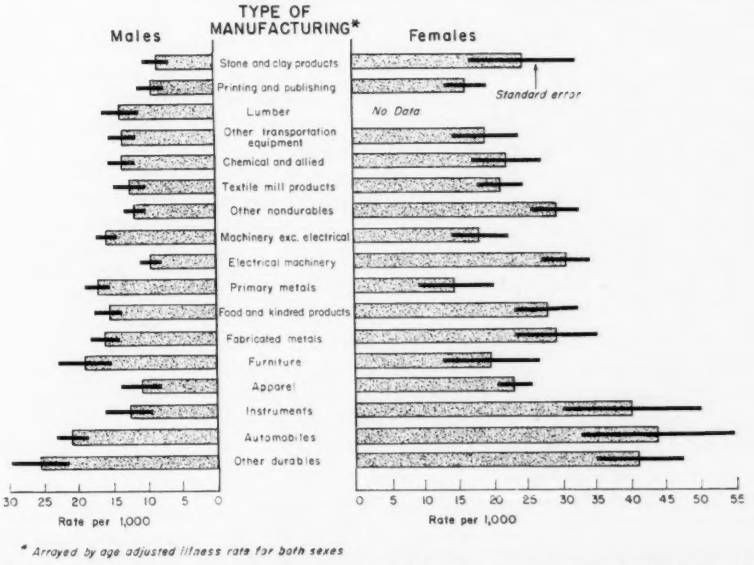


Fig. 4—Illness rates on an average workday, by type of manufacturing and sex. Private civilian wage and salary workers in manufacturing. United States, July, 1959, to June, 1960. (Illness lasting a workweek or more. Rates are age-adjusted.)

Employment and Illness

In Table V, data shown in Tables II, III, and IV are combined and arrayed by illness rates. The total population represented is the 55,000,000 employed civilian wage and salary workers in the United States. A study of employees ranking high and low on this list might permit some generalizations as to some of the factors associated with high and low rates of absenteeism due to illness reported for our working population.

Summary

This paper presents previously unpublished illness data compiled by the U. S. Department of Labor, Bureau of Labor Statistics, for the period July, 1959, to June, 1960. These data provide a fairly comprehensive picture of illness by occupation, industry, type of employment, and type of manufacturing in the United States.

Table V—Percent Absent on an Average Workday Because of Illness, by Occupation and Sex, Civilian Wage and Salary Workers, United States, July 1959-June 1960*

Male		Female	
Employment†	Percent Absent (Age-Adjusted)	Employment†	Percent Absent (Age-Adjusted)
Railroad industry	2.5	Automobile manufacturing	4.4
Automobile manufacturing	2.1	Instruments manufacturing	4.0
Furniture manufacturing	1.9	Electrical machinery manufacturing	3.1
Forestry, fisheries, mining industry	1.8	Fabricated metals manufacturing	2.9
Primary metals manufacturing	1.7	Food and kindred manufacturing	2.8
Telecommunications and other public utilities industry	1.6	Stone, clay products manufacturing	2.4
Fabricated metals manufacturing	1.6	Entertainment industry	2.3
Government	1.6	Apparel manufacturing	2.3
Machinery (except electrical) manufacturing	1.6	Telecommunications and other public utilities industry	2.2
Food and kindred manufacturing	1.5	Chemicals and allied products manufacturing	2.2
Construction industry	1.5	Textile mill products manufacturing	2.1
Finance industry	1.4	Furniture manufacturing	1.9
Business and repair industry	1.4	Railroad industry	1.9
Lumber manufacturing	1.4	Machinery (except electrical) manufacturing	1.8
Chemicals and allied products manufacturing	1.3	Retail industry	1.7
Instruments manufacturing	1.3	Personal services (except private households) industry	1.7
Tetile mill products manufacturing	1.2	Printing and publishing, manufacturing	1.6
Personal services (except private households) industry	1.2	Wholesale industry	1.6
Apparel manufacturing	1.1	Finance industry	1.5
Wholesale industry	1.1	Primary metals manufacturing	1.4
Retail industry	0.9	Construction industry	1.4
Electrical machinery manufacturing	0.9	Government	1.3
Printing and publishing, manufacturing	0.9	Business and repair industry	1.3
Entertainment industry	0.8	Private household industry	1.1
Stone, clay products manufacturing	0.8	Agriculture	0.8
Agriculture	0.8	Educational services industry	0.5
Educational services industry	0.6		
Private household industry	0.4		

*Illness lasting a workweek or more
†Arrayed by Illness rate

one: clerical and kindred workers.

By type of employment, illness rates are lowest for agricultural workers. For males, they are highest among government workers and, for females, highest among private non-agricultural workers. Male government employees have higher illness rates than female government employees. Among government workers, the lowest illness rates are for those in educational services.

By industry, illness rates vary considerably, with the highest male rate six times the lowest and the highest female rate nearly five times the lowest. Male illness rates exceed female illness rates in construction, railroads, other transportation industries, finance, business and repair, and educational services.

By type of manufacturing, illness rates are more uniform than by industry, with the highest illness rates about three times the lowest. Female illness rates are generally high for all types of manufacturing and are exceeded by male rates only in primary metals.

These data are generally consistent with other information available regarding illness resulting in absence from work.

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Appendix

Measurement of Illness in the Labor Force Survey—Illness lasting an entire workweek is identified for each person 14 years of age and over from the following series of questions:

"Did ..... do any work at all last week, not counting work around the house?" If "No":

"Was ..... looking for work?" If "No":

"Even though ..... did not work last week, does he have a job or business?" If "Yes":

"Why was he absent from work last week?"

Answers to the last question fall mainly into four categories: own illness, on vacation, bad weather, and labor dispute. The illness prevalence rate for a single month is the proportion of the enumerated employed civilian labor force who reported that they did no work during the entire week preceding the enumeration because of own illness.

Illness lasting less than a workweek is identified for each employed person 14 years of age and over

who worked less than 35 hours the week prior to the interview from the following series of questions:

"Does ..... usually work 35 hours or more a week at this job?" If "Yes":

"What is the reason ..... worked less than 35 hours last week?"

One category of response to the last question is "own illness." In order to derive the prevalence rates shown in Fig. 1, it was necessary to estimate the average number of days of absence for persons absent less than one workweek. This was estimated at 2.54 days, based on a study by Gafafer and Frasier.[19] Workdays were estimated as 260 per person per year.

Method of Age Adjustment—Because data on workloss due to illness were not available by age in labor force tabulations, it was necessary to make an indirect adjustment for age and to assume that an age-illness relationship reported elsewhere applies to the labor force data. The age-illness relationship assumed is that reported by the U. S. National Health Survey for both sexes for the period July 1958-June 1959 and relates to illness among "usually working" persons lasting a workday or longer.[20] The adjusted rate shown is essentially that which would have been observed if each sex-occupation-industry-etc. grouping were distributed by age as the total U. S. "usually working" population and if the age-illness relationship within each sex-occupation-industry-etc. grouping was the same as the relationship reported for both sexes in the U. S. National Health Survey.

For the period July, 1959, to June, 1960, labor force tabulations are available by age, sex, and occupation, and by age, sex, and industry. Data are not available by age, sex, and type of manufacturing, and the age distributions used were those reported in the 1950 Census.

Standard Error of Labor Force Estimates—The estimates of workers absent on an average workday because of illness presented here are based upon a sample and may differ somewhat from figures which would have been obtained if a complete census had been taken. Figs. 2-4 give a rough idea of the order of magnitude of the standard error of the estimated illness rates by occupation, industry, and type of manufacturing. The chances are about 68 out of 100 that an estimated illness rate would differ from a complete census by less than the standard error.

The standard errors for annual data are estimated by the author as 4/11 of the published standard errors of rates for monthly data.

Source of Data—Illness rates presented in Tables I-IV are from the following CPS UNIVAC 1105 tabulations: Table I is based on Tables 21 (population) and 44 (illness); Table II is based on Tables 15 and 16 (population) and 42 and 45 (illness); Table III is based on Tables 23, Part II (population) and 41 (illness); Table IV is based on Table 23, part II (population) and 43 (illness). These tabulations were prepared monthly beginning in March 1959. See Table of Contents, CPS UNIVAC 1105 Tabulation Specifications, U. S. Department of Labor, Bureau of Labor Statistics (mimeographed).

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Mental Health in Industrial Practice

II. EARLY DETECTION OF EMOTIONAL DISORDER

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THE TRADITIONAL role of the physician in industry is primarily that of a practitioner of preventive medicine. The emotional life of the employee offers a fertile soil in which to apply preventive techniques. A properly designed employee health program will do much to minimize emotional disturbances in the personnel of an industrial organization. Early detection of beginning emotional disorder might properly be classified under prevention, for during the early period treatment is not difficult and is usually successful. Five major areas out of which critical problems often arise for the worker and management are alcoholism, traumatic neurosis as related to industrial accidents, dependency, marital or family relationships, and the work environment itself.

Alcoholism

The Yale University Center of Alcohol Studies has developed a plan for industry which points toward education and rehabilitation.[1] The program is so planned that it will discover relatively early the employee with a drinking problem. Chronic alcoholism is very difficult to treat. The earlier the problem drinker is discovered, the greater the likelihood of success in rehabilitation.

Often supervisors and fellow employees will cover up for an alcoholic so that his illness is not detected until he can no longer function. Then this man is lost to industry, his family, and society.

The focus of the Yale Plan is counseling and referral. The supervisors try to detect the problem drinkers and approach them in a nonjudgmental manner, helping them to become aware of the problem and encouraging them to seek aid through the medical department and other designated sources.

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Traumatic Neurosis

Traumatic neurosis is fairly frequent in industry. Physicians today know that most such neuroses can be prevented. At the time of accident or injury, the personalities of people are stirred up; they are wide open for constructive, humane help, or they may turn to unhealthy, latent neurotic patterns.

The physician in industry should learn how to give early supportive treatment to persons suffering from a psychological blow. The first thing to be done, of course, is to deal with any physical injury immediately and adequately. Often the employee is not injured nearly as badly as he thinks, and he must be shown that he can move his body and extremities by both passive and active maneuvering. By all means, he should be encouraged to ventilate his initial feelings about the situation and not suppress his emotional reaction.

Those who work with the injured should display a confident, calm, and understanding attitude during a crucial initial catastrophic state and be able to make necessary decisions and assume responsibility. Overexcited friends and relatives who crowd into the patient's vicinity should be sent out of his presence. The patient then should be given sufficient sedation to insure prolonged sleep, and should be isolated from all persons, including lawyers and union representatives, who would suggest taking advantage of the catastrophic situation.

Very soon after the injury the patient should be given the feeling that he is well taken care of and that he will be able to go back to work and assume responsibility for his family. The meaning of his initial anxiety reaction should be explained to him and he should be assured that his fears and anxiety will disappear. It often helps to bring to his attention his need to recover because of his responsibility to his family and to his job.

The physician should not be misled by the person who is apparently psychologically unchanged immediately after an accident. We know that in both combat neurosis and trau-

matic neurosis there is often a considerable lag before the stunned ego reacts to the dangers it escaped or the frustrations it experienced. With this knowledge, the physician should initiate supportive therapy.

Often the injured feels guilty because of the possibility of a mistake of his which caused the accident, resulting in the destruction of property or injury to others. Sometimes a person who is not injured, but who contributed to the accident, comes in feeling extremely guilty. If the wrong thing is said to such a person who is already guilt-ridden, he may bear a burden of guilt the rest of his days. Therefore the physician should always be nonjudgmental, reassuring in simple ways, and quick to relieve guilt at the time and for a considerable time after the accident. This can prevent a great deal of the post-accident morbidity that we see today.

The Nature of Traumatic Neurosis—An understanding of the nature of traumatic neurosis is essential in industrial practice. The term itself is actually a misnomer, because trauma alone cannot cause neurosis. Traumatic neurosis follows an accident of some kind, in which the patient may or may not have sustained a physical injury, but one must view the accident as an incident in the person's total life span. Frequently frustrations, strivings, and resentments from the past or from present areas of his life are shifted over to his work relationships.

The traumatic neurosis often happens at an opportune time for the patient. It often comes at a time when he is in a bind—he is about to lose his job; he cannot get along with his fellow workers; he views his job as a dangerous one; or a crisis is arising in his home situation. It is meaningful at this point to consider the connotation of the word trauma. Its broader meaning, derived from the Greek, not only means wound but also defeat.

The nuclear problem in traumatic neurosis is secondary gain. During almost any illness the patient regresses to a childhood pattern and is given increased amounts of love, care, and protection. If such a patient has strong unconscious yearnings to be taken care of and deep dependency needs of all kinds, he will resist recovery from his illness, whether it be real or fantasied. If compensation is involved, the money symbolizes love, security, and concern. He also concludes that if people take such good care of him he must have value, and this gives him some sense of self-esteem.

The place of hostility and resentment should never be minimized in a traumatic neurosis. Even though the patient once thought well of his company, he now has a grievance toward it because it did not protect him properly but permitted him to be injured. Now he is distrustful of the company, the physician, even his fellow employees. The situation may reawaken feelings about his parents and how they failed him. This hostility is necessary to justify to himself his not working and his accepting compensation from the company, often when compensation is not deserved.

In injuries sustained in recreational activity, one rarely develops a traumatic neurosis. The athletic tradition requires that the sufferer shall show fortitude, shall minimize his pain, and shall return with the least possible delay to the game. No sense of grievance or resentment is engendered. But in industrial accidents and injuries there is no such salutary tradition. Circumstances seem to invite the sufferer to make the most of the situation. His fright is spoken of as "shock," and the blow on the head is spoken of as "concussion" (if he sees stars). Such terms often give the patient an exaggerated notion of the severity of his injury and create an atmosphere of gloomy apprehension. There follows then the development of a sense of grievance, and the notion of compensation dawns in the patient's mind.

The weeks following an accident are frequently a period of incubation during which the patient meditates upon his suffering and the derangement of his life caused by the accident. Sometimes he is heard to say: "I was made to suffer through somebody's negligence. Somebody ought to be made to pay." The lawyer and physician, inadvertently or advertently, may fertilize this soil of grievance, and there begins to germinate the traumatic neurosis. If litigation is pending, the patient has little inducement to get well, for his prospects of compensation are greater if he enters the court room with a full array of symptoms rather than a story of recovery from past injury.

One often hears that, since weekly compensation payments are far less than the sufferer's normal income, the desire for the former cannot play a primary role in the genesis of neurosis. The answer is that compensation becomes a symbol of redress for his suffering, and the financial loss that absence from work involves serves to demonstrate to others and to himself the reality of his disability. A fear of future ill-health and unemployment is sometimes evoked to account for the persistence of the traumatic neurosis. This is hardly more than a rationalization, and here the trauma becomes the scapegoat to serve the patient's pre-accident psychodynamics.

Symptoms of Traumatic Neurosis—The symptoms of a traumatic neurosis are both mental and physical. There is a combination of anxiety and a strong sense of resentment toward the company and all who participated in the patient's disability. At times the anxiety is overt, and at other times one sees only the defenses against anxiety. Somatic complaints include headache, giddiness, tremor, exhaustion, palpitation, tachycardia, and also symptoms involving the part of the body which is the seat of the injury. Hysterical weakness and spasm may be present. Depression is often a symptom. The state of the individual is such that he presents increased irritability and excessive startle reaction. He has repetitive dreams or nightmares of again being in the dangerous situation. (In the recurrent dreams, the patient recreates the original traumatic situation and tries in the phantasy to face it and bring about a solution.) Another characteristic feature is a fear of returning to the situation in which the accident occurred. This phobic reaction may be masked by the fact that the symptoms which the individual presents give him a basis for avoiding the feared situation. The patient is able to hide the phobia if there are other symptoms upon which he can rationalize his avoidance of the traumatic situation which would stir up his anxiety again. Another commonly seen characteristic of a traumatic neurosis is psychological withdrawal. Such a patient will show a partial withdrawal from environmental stimuli. He can be compared to a wounded dog that retreats under the house in the darkness and solitude to lick his wounds, shut off stimuli, and snarl at any intruders.

In summary, a traumatic neurosis combines the features of an anxiety neurosis and hysterical reaction.

Prognosis for the traumatic neurosis is poor, especially if a long time elapses before something definitive is done in treatment. In litigation, mountains are made out of molehills, and this plays a major role in "fixing" the neurosis. The physician can do much to avert the development of a neurosis by refraining from alarmist views and prognoses and by maintaining a dispassionate attitude. Often improvement begins when the legal claims are settled to the satisfaction of the patient. The improvement may come about in response to treatment, or, paradoxically, the condition which did not respond to any kind of therapy may now improve spontaneously.

Improvement is not always rapid, nor does it always end in complete recovery. The employee who has had to cast himself in the role of a disabled person for one or several years until his claim comes to court is at that time likely to be profoundly demoralized and to have an invincible reluctance to resume a normal working life, especially if he is past middle age. On the other hand, an employee who is fairly stable and is treated wisely and with encouragement from the outset, so that undue fears and a sense of resentment do not develop, may have an early recovery.

One aspect of compensation plans which works against rehabilitation is cessation of any assistance if the individual goes back to work at all. An employee who is plagued by doubts as to whether he can regain full earning capacity may hang on to the reduced income of compensation rather than take the chance of finding out whether he can earn more. This was pointed out long ago by one of the world's most eminent psychiatrists, Eugen Bleuler.[2] A review of 70 sources in the literature over the past 20 years on "neuroses and compensation" by staff members of the Houston Veterans Administration Hospital[3] concluded: "There is marked uniformity of opinion among the medical authors that compensation for neurosis should be abolished or that changes in the administration of compensation should be brought about."

It is often difficult to distinguish between conscious and unconscious factors in dealing with traumatic neurosis. Frequently there seems to be a combination of conscious malingering and a true conversion reaction. Possibly the old analogy of the iceberg is a good one—a small part of the ice (conscious aspects) above water and most of the ice beneath the surface (unconscious factors); the sea is always rolling and the iceberg shifts, constantly exposing and hiding new parts. This shifting may confuse the physician in his evaluation of such a patient.

In trying to differentiate between neurosis and malingering, the physician has four major yardsticks:

1. The neurotic willingly accepts medical examination. He submits to and follows any regimen of treatment prescribed. He will also accept a surgical procedure. The neurotic is acutely concerned with his symptoms and consciously searches for diagnosis and treatment. The malingerer fears detection and may avoid medical examination. Besides, he has no pain or disability: hence medical treatment will profit him nothing.

2. The traumatic neurosis permeates the entire personal life of the patient and causes him to lose his capacity for pleasure. He derives no fun from recreational pursuits, from visit-

ing or being visited by friends. He loses his zest for work, and usually his effectiveness on the job diminishes precipitously. The malingerer has no reason to lose his zest for living and his capacity for pleasure, and he is unaware that the preson with a traumatic neurosis does so. This unawareness is important in his detection by the physician.

3. The thought content and the verbal productions of the neurotic patient center around the accident and his subsequent symptoms, and there is an intensity of feeling as he discusses these. The malingerer seeks through the use of colorful words to convey what his feelings do not reveal. In other words, he lacks a deep concern regarding his suffering because he is not suffering. In his efforts to mislead, he often overdramatizes.

4. If a reliable longitudinal survey of the patient's life prior to the accident indicates that he has always been a responsible, honest, and adequate member of society, he is probably not a malingerer. The reverse, however, does not hold. Inadequate, unsuccessful, and incompetent persons do not necessarily become malingerers, but they represent fertile soil for neurosis. If the physician finds on examination a previous history of numerous neurotic symptoms, especially without any obvious material compensation, he should realize that this patient presents considerable likelihood of an additional neurosis or at least an aggravation of his previous state.

The malingerer is not infrequently a psychopathic personality. A review of such a person's history will reveal him to be an extractive person, prone to lying and misrepresentation. He often has a pleasing and ingratiating manner and has a lifelong pattern of manipulating and taking. He is one of society's misfits and lives off the labors of honest men. Industry is a frequent prey of such individuals. In all cases of compensation this disorder should be considered as a diagnostic possibility.

Some physicians distinguish between a compensation neurosis and a traumatic neurosis:[4] "The employee with true compensation neurosis has symptoms similar to those found in traumatic neurosis but with the major difference that these symptoms tend to disappear with payment." Since it is impossible to distinguish between these two types until settlement is made, this is a somewhat restricted criterion. If such a classification is made, we know that compensation neurosis is far more frequent than traumatic neurosis. Also because of the difficulty in separating the two, possibly the proper treatment of both types of cases would be immediate and fair lump-sum settlement, rather than months of negotiations, followed by a protracted series of payments. Legal obstacles, however, often prevent this.

The Problem of Dependency

One of the most significant problems in American life today is the mishandling of dependency. Through vast programs directed toward guaranteeing security in every area of life, we have almost lost the spirit of mature independence. The physician in industry has a pressing need to understand the many facets of dependency because it has profound implications as to when a patient returns to work after injury or illness, how he accepts convalescence, and what he expects in compensation. This understanding can best be reached through an exploration of childhood development.

Mature patients accept the dependency of illness or injury when it is necessary but are eager to give it up when they no longer need it. Others can be divided into two groups: those who crave dependency and those who are afraid of it.

Among those who crave dependency are (1) those who were overprotected as children and conditioned not to want to leave a protected environment; (2) those whose dependency needs were never quite satisfied and who are always seeking what they never got an adequate amount of in childhood. Both types will prolong a convalescence and are hard to get out of bed and back to work after sickness or injury. Compensation or a pension would play into their psychopathology.

Among those who are afraid of dependency are two principal types:

1. Those who avoid help because they are afraid of dependency. They were frightened by helplessness when children. They fear injury or sickness because it will make them helpless, like infants who can be abandoned or rejected by the strong around them. They fail to report for help in minor accidents and illnesses. If put to bed because of such an illness as a coronary occlusion or an injury, they are so restless and unaccepting of this state that they get up too soon. They tolerate convalescence poorly. It is not that they dislike dependency, for they do, but they are frightened by what may happen to them in the dependent state.

2. Those who avoid help because they are ashamed of helplessness. In childhood such persons were not overprotected by a prolonged dependency, but were pushed prematurely into independent activity by their parents, especially their fathers. Love given to them was often conditioned on their being "daddy's big boy." Thus they learned early to be ashamed

of their helplessness, and so they never let anyone, including themselves, think they are not able to take care of themselves, sick or well. Long before they fully recover from an illness or injury they are back at work.*

The proper management of these employees requires an understanding of the psychodynamics behind their behavior.

Marital and Family Relationships

The home is obviously a crucial area in life adjustment, the source of good health or illness. Between 25% and 50% of all employees who consult the psychiatrist at Humble come with a problem related to spouse, child, or parent. An employee's grappling with this problem will directly and indirectly influence his work performance and his interpersonal relationships. Insofar as marital problems are concerned, we have discovered that the three factors dealt with most frequently, and seemingly the important ones in marriage, are (1) the ability to communicate, (2) the ability to offer and receive forgiveness, (3) the ability to give and receive love.

Probably a majority of marriage difficulties are in the area of communication. The wife and husband become unable to talk with one another, unable to express their feelings about one another. Emotions begin building up, and the parties become more and more isolated. Finally they become two distinct islands with no avenues of communication open. The therapist can help to reestablish the communication which once existed.

Two people cannot live together in the bonds of marriage without inflicting injury on one another at times. The ability to offer and also to receive forgiveness is a trait of the healthy minded person.

To mention in the context of marriage the ability to give and receive love seems almost trite. Yet the therapist sees many marriages without love or with a profound distortion of love in the relationship. There are those who are afraid to love because love makes them vulnerable to injury. There are those who cannot receive love for a multitude of reasons, one among them the deep, gnawing feeling that they are not worthy of love. The correction of a defect relating to the giving or receiving of love is a difficult therapeutic endeavor and requires considerable psychotherapy.

We explore these factors with each person who has a marital problem. We lead from these into the person's developmental history, relationships with parents, siblings, and children in an effort to find the roots of problems grouped around the three factors mentioned. When the possibility of divorce is present, we block all efforts to dissolve the marriage until every avenue for strengthening the marriage is explored. We emphasize our commitment to preserving the integrity of the marriage. In the sympathetic working with a marital problem we find many peripheral areas in which we can be helpful.

*For a more detailed discussion of dependency and convalescence see Aldrich.[5]

The Work Environment

Besides the emotional problems that an employee may bring to a job, there may be emotional problems inherent in the job itself. Among these are boredom engendered by the breakdown of many production tasks into small repetitive units which require little skill; a sense of unimportance because of the inability of the worker to see the end-product of his efforts (the small cog in a big wheel in a very big machine), with management off in some distant financial center seemingly giving no thought to the average worker; annoyances of the job—noise, odors, irritants, dirt; potential dangers of the job—poisonous gases, explosions, burns, injuries from equipment.

Conclusion

The purpose of this discussion has been to highlight a few areas where emotional problems find a fertile soil for growth in both worker and management. A few of these problem areas are unique to industry, but others are of a more general nature and can be seen in any setting.

Though medicine has regimens of treatment for diseases in all stages, it has taken the greatest pride in the programs which prevent illness or at least detect it in its earliest stages where treatment is not complex. The physician working in industry, through his preplacement and periodic examinations and his ready availability to the employee at all times, is in a key position for prevention and early detection of both physical and emotional disorders.

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The Continuity of Patterns of Illness and the Prediction of Future Health

Lawrence E. Hinkle, Jr., M.D., Norman Plummer, M.D., and L. Holland Whitney, M.D., New York, N. Y.

AT THE present time, it is unlikely that an actively ill or physically unqualified person will be designated for a job to which he should not be assigned, provided the physician has been allowed to examine him thoroughly enough, with sufficiently elaborate diagnostic tools. But physicians have found it embarrassingly difficult to pick out those who will remain healthy in the future and to separate them from those who will be frequently ill, no matter how carefully they are allowed to examine the candidates. This has been a source of difficulty for employers.

The relation of an employer to his employees is not like that of a life insurance company to its policy holders. An employer is not interested solely in the longevity of his prospective employees. He also wishes to know which of them will be ill and how frequently; for in many types of employment continuous and effective service is more important than long service. The employer would, of course, also like to be able to detect in advance those people who will become disabled or retire prematurely. This desire does not arise simply because he has a stake in the cost of their retirement or disability. An employer cannot view a recurrently ill or prematurely disabled employee simply in terms of so much monetary loss, to be anticipated from actuarial tables and provided for by suitable cash reserves. He also sees this person in terms of disrupted work schedules, special work assignments, impaired effectiveness of other employees, and various administrative problems as well as in terms of the discomfort of another human being.

If one assumes that the only controllable and potentially predictable factors in illness are those agents such as bacteria, viruses, parasites, allergens, toxic materials, and potential sources of trauma which abound in the human environment, one is in a difficult position when it comes to predicting the occurrence of illness. There are, indeed, some systematic sources of infection, poisoning, or injury which can be eliminated from any working environment; but, by and large, the agents responsible for the greater number of disabling illnesses are widely and randomly distributed throughout any environment. Most of the viral, bacterial, and allergenic agents thought to be responsible for the acute respiratory and gastrointestinal illnesses, many of the potential sources of trauma responsible for minor injuries, and a great many of the various types of interpersonal relations and life situations thought to be implicated in the so-called "functional" disorders are in this category. Illnesses caused by such agents are responsible for the greater amount of short-term sickness disability. Furthermore, the various toxic, dietary, mechanical, and hereditary factors which are concerned with the chronic degenerative, metabolic, and neoplastic diseases and which are responsible for the major proportion of premature disability and retirement are also widely distributed. Thus, in any working environment, the potential causes of disease are widespread; yet most of the time only a few people become ill.

During the past 10 years, the Human Ecology Study Program at Cornell University Medical College has focused its attention upon the people who become ill and the factors which de-

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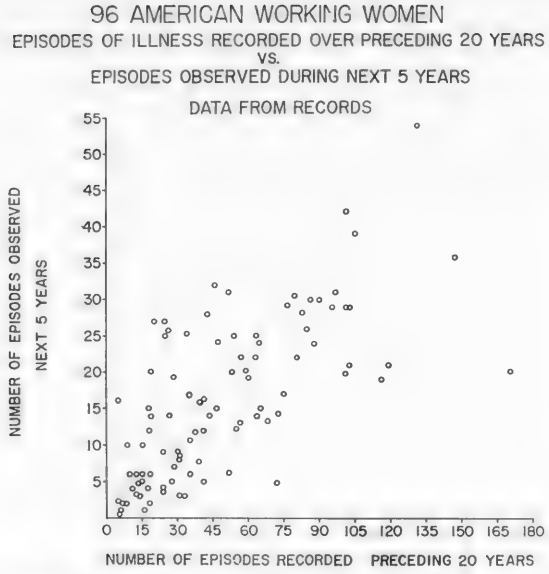
96 AMERICAN WORKING WOMEN
EPISODES OF ILLNESS RECORDED OVER PRECEDING 20 YEARS
VS.
EPISODES OBSERVED DURING NEXT 5 YEARS
DATA FROM RECORDS
NUMBER OF EPISODES OBSERVED NEXT 5 YEARS
0 15 30 45 60 75 90 105 120 135 150 165 180
NUMBER OF EPISODES RECORDED PRECEDING 20 YEARS

Fig. 1—The distribution is significantly different from a calculated Poisson distribution, but approximates that which is obtained from a calculated negative binomial distribution. This "contagious" distribution is based on the assumption that the risk of having episodes of illness is not the same among the members of the population.

termine their susceptibility to illness. This has involved the investigation of the long-term health patterns of a great many people and a study of their interactions with their environments. Included among these have been more than 3,000 industrial workers, who have been studied in collaboration with the medical departments of the American Telephone and Telegraph Company and the New York Telephone Compnay.[1-4]

Selecting groups of similar age, sex, and social and ethnic background who were working in similar jobs, the distribution of all of the manifestations of illness in their members has been ascertained. Within such relatively homogeneous groups of people, who share a largely similar opportunity to encounter the external causes of disease, it was found that the individual members do not all have the same likelihood of becoming ill (Fig. 1). Episodes of illness and days of disability are not distributed throughout the group in the way that one would expect them to be if each person had the same risk of becoming ill. Some members of each group have far more episodes of illness than one would have expected if the risks of all people were equal. The distribution of illness can be explained only if one assumes that some people have a greater likelihood of becoming ill than others.

This observation has been confirmed repeatedly over the past decade in a variety of "homogeneous" populations. It has held true for both disabling and nondisabling illness, regardless of whether the data were gathered from records, examinations, medical histories, or any combination of these, in either prospective or retrospective studies. The net effect has been that one-fourth of the members of each group have accounted for approximately one-half of all the episodes of illness and about two-thirds of the days of disability experienced by the group as a whole in the age period from 20 to 45. This is another way of saying that similar people doing the same work in an essentially similar environment display great differences in their susceptibility to illness.

In general, those who have the greater number of days of disability have been found to have the greater amount of illness when examined by physicians. There are, of course, people who try to come to work no matter how ill they may be, and there are, unfortunately, many others who seem to miss no opportunity to be absent, no matter how minor their sickness. Yet, by and large, those who have the greater amount of disability are those who have the greater number of episodes of illness —and this also has held true in every group we have investigated (Fig. 2).

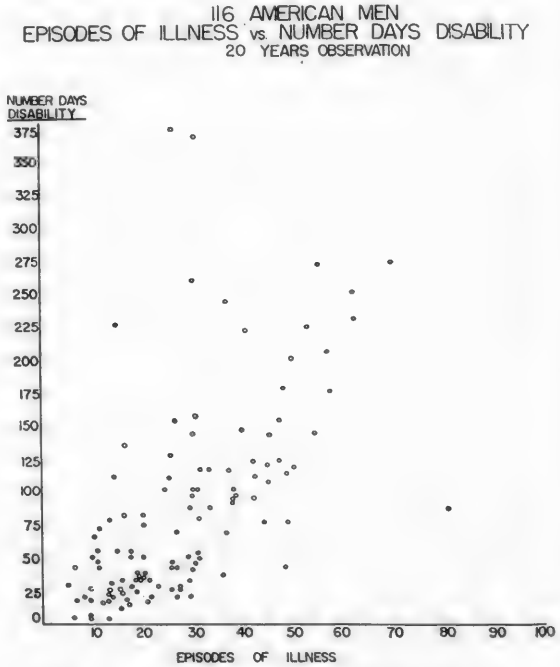
116 AMERICAN MEN
EPISODES OF ILLNESS vs. NUMBER DAYS DISABILITY
20 YEARS OBSERVATION
NUMBER DAYS DISABILITY
0 25 50 75 100 125 150 175 200 225 250 275 300 325 350 375
10 20 30 40 50 60 70 80 90 100
EPISODES OF ILLNESS

Fig. 2—The coefficient of correlation between number of episodes of illness and number of days of disability, based on rank order, is + 0.684. This is significant at the 1% level.

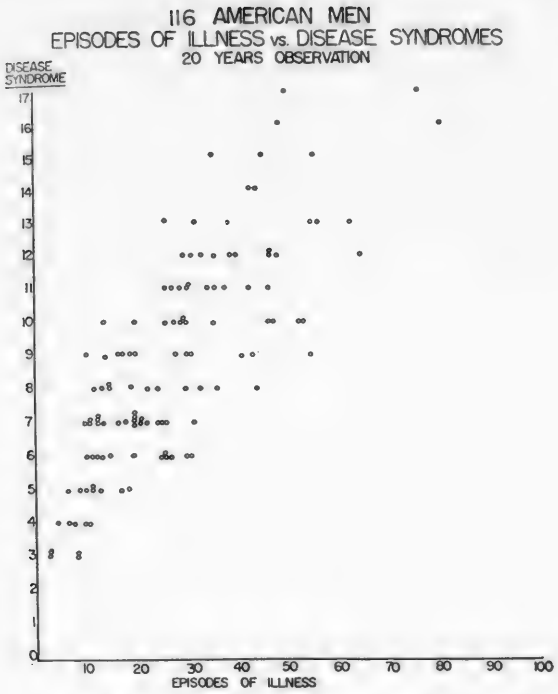

Fig. 3—The coefficient of correlation between the number of episodes of illness experienced and the number of different disease syndromes exhibited, based on rank order, is + 0.785. This is significant at the 1% level.

This is not to say that those with the greater amount of illness are those who have the greater amount of serious, life-endangering illness. In many instances, this is true; but in most cases the illnesses which cause disability and sickness absence carry with them little or no threat of death, and in some cases they are almost trivial.[6]

Those who have the greater amount of sickness absence not only have more episodes of illness but they also have more different kinds of illness, arising from more different causes (Fig. 3). This does not, as one might superficially think, mean that they must encounter more different causes of disease per unit time or that they have a greater general susceptibility to illness based upon a single cause. This seems to be an essentially statistical phenomenon. Since general susceptibility to illness is the sum total of a large number of specific susceptibilities and since these specific susceptibilities may be affected by a wide variety of bodily processes, it may well be that those who have the greater amount of illness are simply people who suffer a greater number of disturbances of their bodily processes over a given period of time, whatever the cause. Since this would affect their specific susceptibilities in an essentially random manner, it would have the effect of increasing both the number and the variety of illnesses which they exhibit.

Thus, one finds that the greater proportion of sickness absence in any given group is concentrated in a relatively small proportion of its members, who have a greater number of illnesses and a greater variety of them also. One might add that, on the whole, these more frequently ill people have a disproportionate number of disturbances of mood, thought, and behavior, and partly for this reason they create additional problems by their attitudes toward their work and their relations with other people. Yet, these are not people who are qualitatively different from the others in their group. Twenty-five per cent of the people account for 50% of the illness simply because this is the way that illness seems to be distributed in the general population of adults. One might equally well have said that 10% of the population account for 25% of the illness or that 50% account for 75% of the illness. In making such a statement, one is merely pointing out an epidemiological phenomenon which has important consequences.

How is one to identify in advance those who are likely to be healthy and those who are likely to be ill? The physical examination and all other cross sectional examinations limited to one point in time are relatively poor predictors. People who have widely different rates of illness may all be healthy to examination at the time of their employment. Similarly, people who have experienced frequent illness and have accumulated many days of disability over many years may show no significant physical defects at a given time in middle life. On the other hand, some people who have chronic illnesses which will undoubtedly shorten their lives, such as hypertension, atherosclerosis, or diabetes mellitus, may have little or no sickness absence over periods of many years (Table I).

Table I—Serious Illness and Chronic Disease Among 20 Men and 20 Women Who Had Experienced Fewer Than 30 days of Disability from Age 20 to Age 45

Disease	No. Affected
Glioma of thalamus, which caused death	1
Hypertensive vascular disease	5
Diabetes mellitus	1
Chronic bronchitis	1
Chronic bronchial asthma	1
Eczema	1
Osteoarthritis	3
Obesity	7

Table II—20 Frequently Ill American Working Men

Episodes of Illness Experienced During 20 Years of Observation Categorized by the "Organ System" in which the Primary Manifestations of these Illnesses Occurred

Episode	No. of Episodes
1. Respiratory illnesses (chiefly common cold, grippe, sore throat, and pharyngitis)	395
2. Gastrointestinal illnesses (chiefly acute gastroenteritis)	215
3. Generalized infectious diseases	4
4. Biliary tract disease	2
5. Genitourinary disease	2
6. Cardiovascular disease	7
7. Metabolic and endocrine diseases	2
8. Diseases of muscles and fascia (chiefly myositis and hernia)	34
9. Disease of bones and joints	40
10. Diseases of skin	92
11. Diseases of head	6
12. Diseases of eyes	33
13. Diseases of ears	11
14. Diseases of teeth	35
15. Disturbances of mood, thought, and behavior	7
	885

Psychological characteristics also may not be good predictors of future health, although they are in some respects more valuable than the physical examination alone. The illnesses experienced by those who are frequently ill are in large part bodily illnesses, which may be significantly influenced by psychological disturbances but which are not, in the last analysis, dependent upon them. It is true that the general attitude of a man toward his work and his psycholigical need for being ill and being dependent are important determinants of his sickness absence; but it is erroneous to assume that the frequently ill are all "psychoneurotic" people. The majority of their illnesses are not of a neurotic nature (Table II). Psychoneurotic people may, as a group, have a great deal of sickness absence; but some psychoneurotic people (especially those who are characterized by excessive meticulousness, attention to duty, and compulsive behavior) may be most reliable in their attendance. Furthermore, regular attendance at work is not necessarily associated with other psychological traits that are desirable. In some of the groups that we have studied, some of the healthiest people have been relatively less intelligent, imaginative, and ambitious than many of their fellow workers. In other groups, some of the healthiest people have appeared to be somewhat callous, irresponsible, and self-seeking. On the other hand, some frequently ill people are intelligent, ambitious, creative, and highly responsible, and some of them are valuable employees for this reason.[5]

Up to now, it has been our observation that the most reliable predictor of the future health of a man is his past health over a period of years, especially if during this time he has been in an occupation similar to this present one. Individual patterns of illness do fluctuate from year to year, but if one compares the attendance records of sizable groups of people for a period of five years or more with their attendance records over a subsequent, independent period of years, one often finds a correlation of + 0.6 to + 0.7 between individual performances during the two periods (Fig. 4). "Days of disability" will correlate less closely than "episodes of illness" over the two periods because of the occasional occurrence of single, prolonged illnesses in one period or another.

This positive correlation between sickness absence over two periods is based upon a relative continuity of patterns of illness itself. This may be shown by comparing the occurrence of illnesses as observed by physicians during two

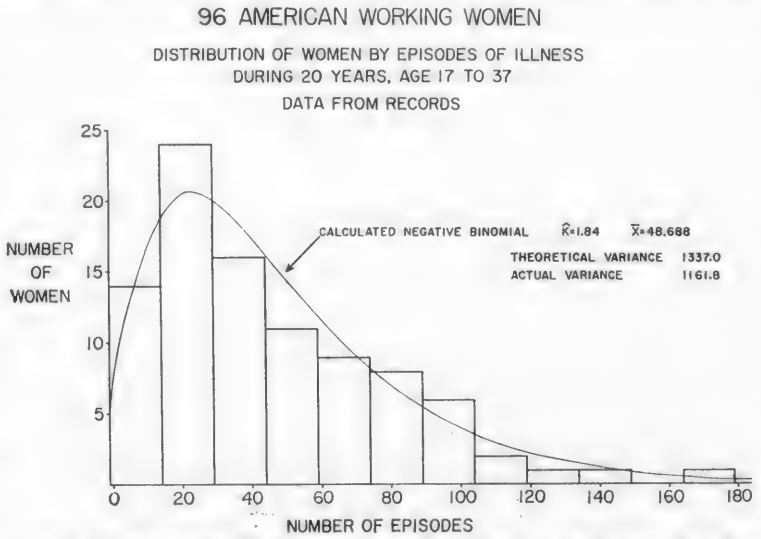

Fig. 4—The coefficient of correlation between individual rates during the two periods based on rank order is + 0.713. This is significant at the 1% level.

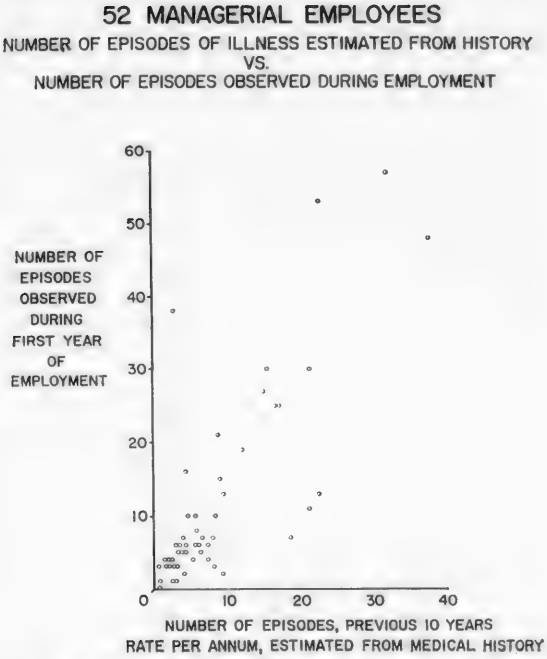

Fig. 5—The coefficient of correlation between mean number of episodes of illness per year, during the previous 10 years, and number of episodes observed during first year of employment, based on rank order is + 0.74. This is significant at the 1% level.

independent periods. Indeed, the medical history itself, if taken in a quantitative manner, using a questionnaire designed to estimate the number of minor disabling episodes of illness that have occurred, can be used in the same manner (Fig. 5). Such a history does not yield data of great precision, but it is accurate enough so that those in the top ranks with regard to illness may be differentiated from those in the bottom ranks. One thus has a tool for predicting future health performance. It is not a tool of refined accuracy, but it will pick out a modest proportion of those who are most likely to have frequent illnesses and who will, therefore, be the most costly in terms of unreliability and impaired productivity.

Assuming, then, that one can, in one way or another, identify a relatively small proportion of employees who contribute a disproportionate amount of sickness absence, what can be done about it? Except in extreme instances, one surely would not wish to deny these people employment. There may be certain categories of work in which the utmost reliability is necessary and from which one might reasonably exclude the most frequently ill people on this basis alone. Yet, it will be recalled that the working populations which were the basis for some of these studies were made up of steadily employed working people, considered to be healthy by themselves and their fellow workers. They were, in short, rather representative samples of American working people in the prime of life. Based on the findings in these groups, it is reasonable to suppose that approximately 25% of the healthy working population in the prime of life accounts for approximately half of all the absence that occurs in this population. One would not seriously propose that one-fourth of the members of the working population, or even one twenty-fifth of them, should be systematically denied employment because they are people more likely to be absent from work. Simple statistics, if nothing else, would argue against this. Furthermore, when one looks at the personal characteristics of those who are frequently ill, one finds that many of them are people who have superior attributes which offset their poor attendance to some extent. One also finds that many of them are laboring under difficulties and responsibilities which seem to contribute to their frequent absence. Thus, to deal with such frequently ill people arbitrarily would often lead to the loss of employees valuable for other reasons and in many cases would do a rank injustice to a person deserving of sympathy and support.

But, in spite of this, one must emphasize that the data here presented do not conflict with the time-honored observation that a taut policy with regard to sickness absence and careful administrative supervision will greatly reduce the amount of absence in any group. The great majority of all the illnesses which produced absence are of a very minor nature, and many of the people who are most frequently absent lose time as much because of their attitudes and habits as because of their minor illnesses. Large differences in the total amount of disability attributable to a group of people may depend upon so simple a matter as whether or not it is customary for an employee to spend two days or five days at home with a cold or to be absent because of headaches or menstrual cramps. When management makes it clear to employees that good attendance is an aspect of good work and poor attendance will not be overlooked, when excessive self-concern is frowned upon by other employees, and when the general attitude is that one is expected to work if one is able, then sickness absence may decrease as much as 50%. Group pressures, of course, can be overdone; there is a reasonable amount of sickness absence to be expected of humans, and its abolition is an idle dream. Yet, in our experience, no harm is done to health if it is

understood that productivity and good attendance will be rewarded and that continued poor attendance creates a problem which must be solved.

Of primary importance in the management of sickness absence is careful administrative attention to individual cases on a continuing basis. If each episode of illness is treated as an isolated incident and is handled on an arbitrary basis without sufficient knowledge of the pertinent facts, then control of attendance will not be achieved, administration will be ineffective, and sometimes an injustice will be done. The basis of human health and behavior is so complex that general policies can be applied to specific cases only when those responsible for making decisions possess all the pertinent facts about each particular case as well as a background of experience in dealing with similar cases. This requires close cooperation between management, the company medical department, and the private physician of the employee.

It is generally agreed that the control of attendance (as distinct from the control of health) is the primary responsibility of the management and not of the physician. In the light of all that has just been discussed, it would appear that the administrator can most wisely turn his attention to those members of the employee group who have most consistently, over a period of years, displayed the worst attendance records. If the administrator becomes concerned about the attendance of an employee, it is important that he express this concern directly to the employee and make clear to him the attitude of the management and its administrative responsibilities. Since poor attendance is so often associated with ill health, the administrator would also do well to advise the medical department of the company about his problems and concerns in each case and about the administrative measures which he plans to take.

The company physician, for his part, should make every effort to obtain complete and accurate medical information about the cases referred to him, and he should consider any recent episodes of illness in the light of the past health record of the employee and his prospects for future health. He should advise the administrator (as far as he can ethically do so) about the pertinent medical facts in each case, even when this information is not entirely pleasant for the administrator to hear. He should also advise him about measures that might be undertaken to benefit the employee's health and attendance. He will do well to consult with the employee's private physician to ascertain his views, to obtain his recommendations, and to explain to him some of the problems and attitudes of the company management. If the private physician looks upon a given episode of illness as an isolated case not likely to recur and places what appears to be undue weight upon the present physical and laboratory findings, then the company physician might make him aware of the past health record of the employee and let him know the medical department's experience with regard to the likelihood that similar illnesses will occur in the future, even though there may be negative findings in the interim.

In nearly every instance, someone—a supervisor, a company physician, or the private physician—must sit down with the employee in confidence and ascertain the true facts of his present life situation. All too often, it will be learned that this person is involved in domestic difficulties, faces heavy financial burdens, is the principal support of a number of dependent people, is attempting to hold two jobs, or perhaps is involved in a situation at work which he finds intolerable. All of this may play an important part in his illness, his absence, and his general attitude and behavior. With the employee's consent and cooperation, the supervisor, the company medical department, and the private physician, each working in his proper sphere, can then make every reasonable effort to arrange whatever readjustment in employment, personal life, or medical treatment seems to be feasible and conducive to the employee's good health. At the same time, the administrator should make known to the employee the various administrative alternatives which will be considered if, after all feasible measures have been taken, his health and attendance still cannot be improved to the point at which he can work effectively. He and his physican can then take these into account in their future plans, and, if painful and difficult administrative decisions must be made, they can be carried out with the fewest possible ill effects.

One cannot expect an easy solution to the difficult problems created by illness among working people. Intensive investigation of these problems thus far has served primarily to reveal to us how complex they really are. One can give no assurance that even the greatest of these problems can be overcome. But, nevertheless, it is clear that if any advance is to be made they must be approached with careful attention, with adequate information, with continuous and effective administration, and with a dispassionately helpful attitude on the part of all concerned.

(Dr. Hinkle's address is New York Hospital-Cornell Medical Center, New York 21, N. Y.)

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INDUSTRIAL HYGIENE FOUNDATION

will hold its

26TH ANNUAL MEETING, OCTOBER 25-26, 1961
MELLON INSTITUTE, PITTSBURGH, PA.

The program of scientific presentations will be as follows:

JOINT MEDICAL-LEGAL CONFERENCE—Concurrent Session, Wednesday Morning

Panel Discussion: The Lungs, the Environment and Compensation—Moderator: O. A. Sander, M.D., Associate Clinical Professor of Medicine, Marquette University; Arthur J. Vorwald, M.D., Professor and Chairman, Department of Industrial Medicine and Hygiene, Wayne State University; George W. Wright, M.D., Head, Medical Research Department, St. Luke's Hospital; William C. Hartman, Sanders & Dempsey; James L. Hill, Office of General Counsel, Ford Motor Company

CHEMICAL-TOXICOLOGICAL CONFERENCE—Concurrent Session, Wednesday Morning

Immunologic and Tolerance-Producing Capacity of Ozone—Herbert E. Stokinger, Ph.D., Chief, Toxicology Section, Division of Occupational Health, U. S. Public Health Service

Review of the Toxicology of Halogenated Hydrocarbons—Speaker to be announced

Flame Ionization Method of Analysis—A. J. Andreath, Central Research Division, American Cyanamid Company

Engineering Conference—Wednesday, All-day

Industrial Hygiene and Safety Precautions in a South American Copper Mine—S. M. Jarrett, Director, Safety and Industrial Hygiene Department, Braden Copper Company

The Measurement of SO_2 and NO_2 by the National Air Sampling Network—John B. Pate, Robert A. Taft Sanitary Engineering Center, U.S. Public Health Service

Role of Adhesion in Electrostatic Precipitation—G. W. Penney, Electrical Engineering Department, Carnegie Institute of Technology

Radiation Exposures from both Industrial X-ray Machines and Sealed Radioisotopes Used for Radiography—R. G. McAllister, Radiation Hygienist, Liberty Mutual Insurance Company

Technical Aspects of the Thermowheel Heat Exchange System—C. F. Bonilla, Ph.D., Department of Chemical Engineering, Columbia University

Evaluation of Potential Health Hazards Associated with the Operation of Plasma Jets—Speaker to be announced

Infra-red Air Pollution Detector—Speaker to be announced

Use of Portable Gas Indicators for Measurement of the Explosive Gases in Baking Ovens—Speaker to be announced

JOINT MEDICAL-CHEMICAL-TOXICOLOGICAL CONFERENCE—Concurrent Session, Wednesday Afternoon

Biologic and Medical Problems Associated with Plastics and Resins—Speakers to be announced

LEGAL CONFERENCE—Concurrent Session, Wednesday Afternoon

Legislative Developments in Workmen's Compensation for 1961—Theodore Hetzler, Jr., National Association of Mutual Casualty Companies

Developments Relating to Mental Health—Hugh M. Jackson, Director of Training, Johns-Manville Corporation

Duplication of Workmen's Compensation in Social Security Benefits—Douglas M. Soutar, Director of Industrial Relations, American Smelting and Refining Company

MANAGEMENT CONFERENCE—Thursday, All-day

Health Aspects of Air Pollution—Philip Drinker, Sc.D., Fitzwilliam, N.H.

Occupational Health Problems Facing Industry Today—C. R. Williams, Ph.D., Assistant Vice-President, Liberty Mutual Insurance Company

Labeling of Hazardous Substances—Speaker to be announced

Silicosis in Metal Mines—Henry N. Doyle, Chief, State Services Branch, Division of Occupational Health, U.S. Public Health Service

Management Health Examination Program in General Motors

S. D. Steiner, M.D., Detroit, Mich.

PREVENTING illness and promoting health among employees is sound business practice. For this reason, industrial medicine has been the leader in promoting periodic health examinations.

There are many articles by examining clinics describing medical findings on individuals submitting to routine periodic physical examinations.[1, 2] Most of these reports deal with examinations among the so-called executive group, which is the usual group sent by their companies to a clinic for an examination. (Wade[3] has stated that his experience does not show any significant health hazards for the executive versus the nonexecutive.) However, the literature contains scant information concerning the patient's attitude toward the examination, and this factor is important in planning and improving medical examination programs.

For the past 25 years, preemployment and periodic physical examinations have been part of the General Motors medical program. In 1944, in addition to the programs provided by the Corporation medical departments, provision was made for the management group to have physical examinations by clinics or private physicians. The program specified that the examining physician, or clinic, must be approved by the Corporation Medical Director, but the examination results were to be confidential between the patient and the examining physician. This policy still prevails.

The examinations have served three main purposes:

1. For normal healthy persons a baseline of health is provided—that is, laboratory, x-ray, and physical normals are established for the particular individual.

2. Abnormal or pathological conditions may be discovered at an early stage when treatment or change of living habits may be effective.

3. By submitting to an annual examination, the employee becomes health conscious and tends to change his living habits when advised to do so. Also, he becomes more conscious of the health of his family and associates.

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Program Evaluation

The General Motors management health examination program has continued in effect since 1944 with none of the basic principles of the examination being changed. This report is a study of the program for the past 15 years. The purpose of the study was to determine the benefits of the program and recommend any changes indicated.

The program was evaluated in three ways:

1. A study was made as to the frequency with which the executive took advantage of the examination, and of the use and popularity of various clinics.

2. The eligible group was surveyed to determine their attitudes toward the program, as well as their comments—both favorable and unfavorable—regarding the examining clinics. The survey also requested information regarding the extent unknown medical conditions were found and what corrective action was taken.

3. A one-day meeting was held with representatives from the clinics doing the majority of the examinations. At this meeting, results of the survey and analysis of the program were discussed, and opinions were obtained on the significant items that should be included in the examination.

This paper presents the significant findings from these three approaches to the evaluation of the program.

Analysis of Program

Participation

Through 1959 almost 45,000 physical examinations were made. Since its inception about 67% of those eligible have taken advantage of the program. This percentage has varied from only 53 in one year to 82 in another year. Participation by divisions of the Corporation has varied a great deal. The variation between divisions is governed by the amount of encouragement the employee receives. There is almost 100% participation in those divisions where the medical department contacts the employee for his preference of clinic and date and then schedules the examination. This is more important than whether the examination is on an in-patient or an out-patient basis, or the proximity or functions of the examining clinic.

Selection of Clinic

There is a natural selection of clinics by the eligible group. The program encourages the examination to be done at a clinic in the general area where the executive lives and works. However, most areas provide for two or more clinics and so in most instances a choice is possible. Comparison was made of the 10 clinics doing most of the examinations (Table I).

The results suggest there is a difference in the examination program at various clinics and the executive tends to go where he feels he gets the best examination. Some definite trends can be noticed from the table. Clinic 1 has had a high continuing demand, while Clinic 3 has shown a gradual decrease. Clinic 6, which has been used only in recent years, has increased enormously. Clinics 9 and 10 show trends in exact reverse of each other.

This Table indicates that recipients of the examinations do compare the service rendered and go to the clinics which, in their opinions, give the best examination.

Table I—Leading Participating Clinics

Clinic	Number of Executives Examined				
	1955	1956	1957	1958	1959
1	461	438	501	507	473
2	337	392	405	337	373
3	300	348	322	265	276
4	202	244	304	231	280
5	219	218	198	189	185
6	*	14	129	175	181
7	162	181	186	157	176
8	170	175	152	151	155
9	95	99	125	128	124
10	135	109	116	80	82

* Fewer than 10

Management Survey

In order to obtain further information on the attitudes of the management group participating in the program, a questionnaire was sent to 5,538 eligible executives, of whom 70% completed and returned the form. The questionnaire was designed to determine the executive's opinion about (1) the examination received, (2) the clinic selected, and (3) benefits of the program.

The Examination

During 1959, examinations were conducted by 109 clinics and hospitals and 572 examinations were done by personal physicians. More than 90% of the executives felt that the examination they received was thorough. Of the 10% who had complaints about the examination, the main criticisms are shown in Table II.

The executive dislikes an examination which does not have a personal relationship with the examining physician. Clinics that tend to stereotype the examination and delegate the activities to the resident staff are not satisfactory. The clinics which stress the personal relationship between the physician and the patient have had increased demand.

The desirability of doing the examination on an in-patient basis has received some discussion in recent years. The General Motors program provides that the examinations can be done on either an in-patient or an out-patient basis. The group was asked their preference. Forty-seven per cent favored having the examination on an in-patient basis. Those preferring hospitalization felt that it was more convenient and that they received their examination with a minimum amount of interference and delay.

The attitude of management toward a written report is shown in Table III.

This part of the survey demonstrated con-

Table II—Criticisms of Examinations

1.	Production line methods
2.	No personal doctor-patient relationships
3.	No written report or discussion of results of examinations

Table III—Attitude on Written Reports

		%
1.	Wanted written report	100
2.	Received a written report	90
3.	Results of the examination reviewed with staff physician at conclusion of examination	90
4.	Written report of examination reviewed by doctor of own choosing	50

Table IV—Reasons for Selecting Clinic

	%
Recommended by corporation or plant physician	55
Recommended by friend	48
Recommended by own physician	44
Previous personal experience	34
Previous experience of other members of family	12
Convenience of location	11

Table V—Reasons for Using Same Clinic More than Once

	%
Records there of previous examinations	62
Thoroughness of examination	58
Attitude of doctors and staff	53
Convenience of location	49
Accommodations, facilities, and equipment	48
Convenience of scheduling	36
Promptness and punctuality	35
Other reasons	11

clusively that executives not only want to talk over the examination with the physician but also to receive a written report. The executive has been encouraged to have the report reviewed by a doctor of his own choice.

The Clinic Selected

Usually the executive has several clinics from which he can select the one he prefers. Questions were asked to determine how the selection was made and why he kept going to the clinic of his choice.

The reasons given for selecting a particular examining clinic or doctor are shown in Table IV (because more than one reason could be given, the total exceeds 100%).

Another question was: If the same clinic is used more than once, what influenced the executive to return? The reasons given are shown in Table V. (Again, more than one reason could be given, and so the total is greater than 100%.)

The significance of these tables is that the thoroughness of the examination and attitudes of the doctors and staffs are major reasons for the selection of a clinic. This is not surprising, but it does show that the quality of medical care is evaluated by the consumer just the same as other goods and services.

The examination is as thorough as the examining physician believes necessary to determine the health status of the employee. For this reason many examinations last more than one day. The time required for the examination is shown in Table VI.

Special tests, x-ray studies, and indicated consultations are all considered in computing required time for the examination. Some clinics

Table VI—Days Required for Examination

	%
1	15
2	36
3	43
4 or more	6

use the time to better advantage than others. Considering the scope of the examination, two to three days is not excessive.

Benefits of Examination Program

An examination program of this type and magnitude is costly both in time and money. It is a natural question then to ask what benefits the executive receives. Ninety-eight per cent stated that the program was beneficial to them and that they wanted to continue receiving examinations. The general comments given were:

1. Conditions revealed are being treated or have been corrected.
2. Advice received on living habits was beneficial.
3. Serious ailments were avoided.
4. Examinee was made more health conscious.
5. Examination gave peace of mind.

These comments alone are sufficient to continue the program. In order to get the benefits into a clearer perspective, the question was asked if any unsuspected conditions had been revealed by the examination. The answers are given in Tables VII and VIII.

The examination program not only brings to light medical conditions, but more important treatment is instigated. In all instances, whenever treatment is indicated, the executive is referred to a doctor of his own choosing. It is interesting, but not surprising, to note the high percentage who submitted to some form of treatment. The age of the group is predominantly over 40. Our results are similar to those of Bolt, Tupper, and Mallery.[1] Periodic

Table VII—Unsuspected Conditions Revealed by Examination

	%
Yes	47
No	50
No answer	3

Table VIII—Corrective Action Taken for Medical Conditions Found on Routine Examinations

	%
Corrected by medical treatment	51
Corrected by surgical treatment	30
Changes in living habits	60

examinations of this type are good preventive medicine and worth the time and effort required.

Meeting with Ten Clinics

After the analysis of the program and survey of the executives, a one-day meeting was held with representatives of the 10 clinics doing the majority of the examinations. The purpose of the meeting was to review the information and also discuss the examination program, particularly as to the extent of the examination. Interchange of information between the examining clinics permitted each clinic to evaluate its program in comparison with the others.

No attempt was made to set arbitrary limits, but there was general agreement that executives more than 40 years of age should be examined annually. Those below 40 years of age should receive an initial examination and a screening type of examination every second or third year unless symptoms or history indicated otherwise. The reason for this was to reduce the x-ray exposure in the younger age group.

The general opinions of the group regarding various parts of the examination are stated as follows:

History—A thorough history is the most important single item. A history check-sheet is not adequate. These examinations attempt to detect illness in its early stages and a thorough history is important.

Physical Examinations—A normal physical examination should be done. Chest examination should be complete even though a chest film is taken.

Electrocardiography— Electrocardiography is a routine procedure in all examinations.

X-Ray Studies—X-ray examination should be done whenever the history or physical examination indicates. Photofluorographic x-ray exposure of chest, gastrointestinal series, pyelograms, cholecystograms and barium enemas are the main exposures. Some clinics do gastrointestinal series and gall bladder films only on indication. A suggested rule for x-ray studies is as follows:

1. X-ray examination at all ages if indicated.
2. Under 40 years of age
   a. Annual chest x-ray film
   b. Baseline gastrointestinal x-ray study
   c. Subsequent gastrointestinal series if symptoms develop; otherwise, repeat every three years.
   d. Gall bladder examination every five years.
3. Over 45 years of age
   In the event symptoms or history indicate, a barium enema should be done at any age, but after 45 it should be done every one to three years.
4. Over 55 years of age
   As the executive grows older, less thought need be given to possible damage to the gonadal region.

Laboratory Studies

Serology—A serological test for syphilis should be done, but it is not necessary annually.

Blood Sugar—Because it is more informative, a postprandial blood sugar determination should be made in addition to the determination of fasting blood sugar. A glucose tolerance test, or some variation, is done by many clinics on the initial examination.

Cholesterol—The value of cholesterol levels is undetermined. In general, levels below 250 mg% are considered normal. However, some clinics use 300 mg% as normal. Cholesterol levels should be determined and normals established according to individual clinics.

Liver Function Test—Liver function tests are not included in a routine examination. The sulfobromophthalein sodium (Bromsulfalein) test is the most valuable for detecting early hepatic deficiency and should be done when indicated. This test is not without some danger, and the risk should be kept in mind when the test is made.

Uric Acid—A blood uric acid determination should be included on the initial examination.

Sedimentation Rate—The erythrocyte sedimentation rate is often determined as a routine procedure. However, elevations often occur, and the cause cannot be determined. The test can be done on the initial examination to establish a baseline.

White Blood Cell Count—White blood cell counts frequently are elevated, yet after repeated studies over several years the patient shows no evidence of disease. Whenever an elevated white cell count persists, a complete hematological survey should be done.

Routine Laboratory Study—A routine laboratory study that might be done on the initial examination includes the following determinations, hemoglobin, red blood cell count or hematocrit, white blood cell count, sedimentation rate, uric acid, blood sugar, cholesterol, urinalysis, blood group and RH, flocculation test for syphilis.

Stool Examination—Routine examination for ova and parasites is not necessary unless the patient lives in an area where parasitic infestation is endemic. However, a stool examination for occult blood is a routine procedure.

Colon and Rectal Examination—Sigmoidoscopy examinations provide considerable pathology information and should be done annually.

Often the most valuable information of the examination is obtained in the colon and rectal area.

Written Reports—A report covering the full findings of the examination should be sent to every patient or to the physician of his choice.

Summary and Conclusions

An evaluation was made of a periodic physical examination program covering 45,000 examinations. The examinations were done by private clinics and physicians.

About two-thirds of the eligible group take advantage of the program. There is almost 100% participation when the employee is encouraged to be examined. The employee prefers a clinic which personalizes the examination. Approximately 90% believe the examination is thorough. The others were critical of the impersonal attitude of the examining physician and of the fact that too much of the examination was delegated to the resident staff.

The examination reveals much unknown pathology. In 47% of the subjects conditions were discovered which required treatment. Medical treatment was given to 51% and surgical treatment to 30%. Over 60% of the group changed their living habits.

A one-day meeting was held with examining physicians from 10 clinics. There was general agreement that the examination should be more thorough for the over-40 age group. X-ray studies should be done whenever indicated but unnecessary exposures avoided. Postprandial blood sugar, uric acid, and occult blood tests should be included in the laboratory examination. The colon and rectal examination reveals much pathology information and should be included.

A written report should be sent to the employee or to a physician of his choice.

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THE DIVISION OF OCCUPATIONAL HEALTH OF THE U. S. PUBLIC HEALTH SERVICE

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Full descriptions of these courses are given in the Training Program Bulletin, which is available on request. Trainees may register in single or related courses. Applications or requests for information should be addressed to the Chief, Training Program, Robert A. Taft Sanitary Engineering Center, 4676 Columbia Parkway, Cincinnati 26, Ohio, or to a Public Health Service Regional Office.

The Lead Problem

An Outline of Current Knowledge and Opinion

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LEAD occurs in the human body without any adverse effects. The results of many analyses indicate that the mean daily lead intake of the average North American adult is about 0.3 mg of lead in food and beverages. This same amount is eliminated daily; hence, there is an equilibrium between intake and elimination, and there is no lead retention. The safe level of lead ingestion in food and drink appears to lie between 0.3 mg. and 0.6 mg per day.[1]

Lead may also be inhaled from the air, reach the lungs, and be absorbed into the blood stream. This is supplemented by the lead which is retained in the upper respiratory tract, removed by the action of the cilia, and swallowed. An important factor in regard to air concentration is particle size. Since approximately 90% of the swallowed lead is excreted unabsorbed, a large portion of the lead which enters the respiratory tract may not be absorbed if the particle size is large, and the air concentration, which is determined in terms of weight, may exaggerate the exposure conditions. On the other hand, if all the particles are present as finely divided fume, the effect may be somewhat underestimated.

Air Analysis

Purpose and Use

Air analyses are specific measurements of the environment and permit an evaluation of a hazard where workers are exposed. They also help in determining sources of dissemination and thus point to places where control is needed and at the same time serve as a basis for selecting the most desirable type of control. Air analyses can be used to check the effectiveness of engineering control measures. Hygienic standards for air concentrations are based on laboratory research using animals and field studies correlating the medical observations of exposed persons with data on the concentrations of contaminants to which they are exposed. The better the correlation between air concentration and effects the greater the reliability of the standard.

Safe Atmospheric Concentration

Recently, the Hygienic Guides Committee of the American Industrial Hygiene Association has adopted a standard of 0.2 mg of lead per cubic meter of air as the upper limit of safety for the concentration of lead dust or fumes.

Quantitative Biologic Studies

In view of the fact that exposure to lead compounds has meaning only if lead absorption occurs, numerous studies have been done on urine and blood to provide quantitative information on the relationship between exposure and absorption.

Urinary Lead Excretion

Normals—Normal urinary lead excretion varies from about 0.01 mg to 0.08 mg per liter, and the mean value is about 0.03 mg per liter. Values of 0.15 mg to 0.20 mg per liter have generally been used as an upper safe limit for urinary lead excretion. Concentrations considerably in excess of these levels, however, have been found without any evidence of lead poisoning and, conversely, evidence of poisoning has been present with concentrations of less than 0.15 mg per liter. The higher the level above the normal range, nevertheless, the greater the likelihood that poisoning will occur. The diagnosis cannot be made from urinary lead levels alone; these must be used in conjunction with other data and clinical findings.

Correlation with Air Concentration—Urine analyses may show a low level of absorption even though air concentrations are high because of the large particle size or insolubility

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of the lead compound involved. Contrariwise, air analyses may be low, well within acceptable limits, and urine values high. In one instance, it was found that the exposure was from a source outside the plant.

Sliding Scale—For practical purposes, values below 0.1 mg of lead per liter of urine may be considered of no significance, values between 0.1 mg and 0.2 mg constitute an intermediate zone, and values above 0.2 mg per liter are evidence of hazardous exposure.

Blood Lead Concentration

Normals and Sliding Scale—Blood lead concentration also gives an index of lead absorption, helping in cases of nonspecific symptomatology. There is no specific level of blood lead which can be interpreted as indicating that lead poisoning exists. Blood concentrations of 0.01 mg. % to 0.06 mg % are considered within the normal range for persons with no industrial exposure to lead. Values between 0.06 mg % and 0.08 mg % may be considered as transitional, and values above 0.08 mg % are indicative of unsafe exposure.

Correlation with Urine Levels—The urinary lead and blood lead values should correlate closely. Should they not, the blood level is probably erroneous. There is no evidence, no reason for believing, that there is any kind of susceptibility to lead which results in intoxication if the level of lead concentration in the blood is lower than a certain threshold level, 0.08 mg %.

Use of Standards

Standards must be recognized for what they are, the concensus of a group exercising its best judgment. Using the figures given above and in the following Table, there is validity in evaluating exposure and absorption of lead, but there is no need to place undue significance on one specific figure. Safety standards cannot be used per se to make a diagnosis, nor can they determine the question of causal relation. A diagnosis in an individual case is a medical conclusion on the basis of medical findings to which information of the occupational exposure makes an indispensable contribution.

Hygienic Lead Standards

(Food and beverages)	
Safe atmospheric concentration	Less than 0.2 mg per cubic meter
(Dust or fumes)	
Normal urinary lead excretion	0.15-0.20 mg per liter (Less than 0.10 mg per liter no significance) (0.1-0.2 mg per liter transition zone) (More than 0.2 mg per liter hazardous exposure)
Normal range blood lead Concentration	0.01-0.06 mg % (0.06-0.08 mg % transition zone) more than 0.08 mg % hazardous exposure)

*Adapted from H. H. Schrenk,[1] Hygienic Lead Standards.

Metabolism of Lead

Lead Distribution in Tissues

Everyone eats, drinks, and inhales a variable quantity of lead daily. A portion of the lead inhaled is absorbed from the lungs into the blood. The remainder is swallowed, and 10% or less of the swallowed lead is absorbed. Only certain organic lead compounds (e.g., tetraethyllead) can be absorbed by contact with the skin.

The absorbed lead is distributed to the tissues of the body generally, including the liver, from which it is partially excreted back into the alimentary tract with the bile. Some lead is excreted in the urine. The remaining lead is then deposited in accordance with a definite pattern, the long bones of the skeleton accumulating the major portion.

Total Body Lead

The average gross quantity of lead present in the body of the normal human adult in the United States is not less than 100 mg nor more than 300 mg with due regard to variations in body weight. Present evidence indicates that there is little or no progressive lead accumulation under average conditions of lead intake in the United States.

Increased Exposure

When there is an increase in the lead exposure of a person above his usual or normal level, a number of things occur promptly. There is an immediate rise in the alimentary lead content, as revealed in the feces. This rise bears direct relation to the quantity ingested or inhaled, as most such lead passes through the alimentary tract unabsorbed. But some absorption does take place, from both the lungs and the alimentary tract, and the concentration of lead in the blood, the tissues, and the urine gradually increases. This increase varies according to the size of the daily dose, that is, the intensity and the constancy (or intermittency) of the prevailing exposure. Paradoxically, fecal lead analyses are not of much help clinically, for the much larger quantity of unabsorbed lead that has been ingested with

food masks that which has been taken in via increased exposure, unless such exposure has been overwhelming.[2]

Removal from Exposure

After discontinuance of lead exposure, the lead retained in the body during the period of increased absorption maintains the lead concentration of the tissues, the blood, and the urine above normal levels for a period of time that depends upon both the quantity of lead retained and the time over which it was absorbed. Thus, the concentration of lead in the blood and urine decreases progressively, reaching a normal range in a period of from a few weeks to considerably more than a year. The alimentary tract, on the contrary, is emptied of its abnormal lead content to a very large extent within a few days after discontinuance of exposure. The lead content of the tissues of the body diminishes in accordance with the rate of elevated lead excretion, there being some lag but by no means immobility in this regard on the part of the skeleton. Available analytical data show that approximately normal lead concentrations in the tissues are commonly reached within 12 to 18 months, the skelton being the last to return to the normal range.[2]

Toxicity

The above facts demonstrate clearly that lead occurs in the human body without prejudice to normal health and that a toxic effect on the part of the element is a matter of concentration. They also demonstrate that the absorption and excretion of quantities of lead considerably in excess of the usual and normal levels are wholly compatible with normal and healthy human life and activity and that lead intoxication is not to be expected if certain limits of exposure and absorption are not exceeded.

Qualitative Tests

Disadvantages of Quantitative Tests

The early signs of elevated lead absorption are an increased rate of urinary excretion and increased lead concentration in the blood and in the feces. These are quantitative tests, difficult to run and subject to error by their very nature.

There is always the possibility of contamination; there are few laboratories that are equipped to give accurate reports from the very minute quantities of lead found in blood or urine; and there is dependence on the individual himself in collecting the samples.

Certain Metabolic Changes

Certain blood and urine changes occur in the presence of increased lead absorption, and these changes probably have basic implications in the metabolism of lead. These are a mild anemia, basophilic stippling of erythrocytes, and coproporphyrin in the urine. None is specific for lead, but all are effective in estimating levels of lead absorption.

Anemia—A moderate secondary anemia is almost always seen with lead absorption. But secondary anemia, as its name suggests, may be secondary to a variety of conditions. Persons whose families came from Mediterranean countries, such as Italy, Spain, Greece, may have Mediterranean anemia of the minor type. Their blood picture closely resembles that seen in lead poisoning. Persons with carcinoma, Hodgkin's disease, leukemia, bleeding peptic ulcer also have a secondary anemia.

Stippled Erythrocytes—Stippled red blood cells, too, are not specific, as they are found with any anemia, primary or secondary. Yet, as was pointed out many years ago, the finding of many stipple cells with a relatively slight drop in hemoglobin is characteristic of lead intoxication. No one count of stipple cells is diagnostic, but, under the conditions of hazardous lead exposure, an abrupt and progressive increase in stippled red cells above the previous normal level of the person is strongly suggestive of increased lead absorption. Such an increase cannot be taken as evidence of the existence or imminence of lead intoxication, for large variations occur without symptoms or signs of illness; but they should be considered as harbingers of danger, somewhat in proportion to their magnitude and speed of development. On the other hand, the absence of stippled red cells in the blood constitutes very nearly conclusive evidence that the toxemia is due to some factor other than lead.

Porphyrins—Tests for coproporphyrin in the urine may be markedly positive as a result of intoxicants other than lead, such as alcohol and barbiturates. But, in the known lead worker, its finding in a frank 4 plus is most likely to indicate lead absorption, particularly if liver profile studies are within normal limits. Several clinical workers have noted that qualitative porphyrin tests become positive before stipple cells appear.[3] Observations have shown that lead interferes with hemoglobin synthesis, with iron utilization, and with erythrogenesis in the bone marrow. Studies have also shown that the defective red cells so produced are preferentially removed by the spleen and probably the reticuloendothelial system as well.

This interference in hemoglobin metabolism and red cell maturation is reflected in positive urinary porphyrins, the appearance of stippled red cells, and the development of anemia. No well-defined correlation of these factors has been established, however.[8]

Advantages of Qualitative Tests

The real advantages of qualitative tests lie in that they are practical, fast, and little subject to error. They can be done without fear of lead contamination and do not take the men from work for long periods. Used serially and in conjunction with clinical examination and evaluation, they are effective in estimating levels of lead absorption.

Lead Line

A lead line (Burton's line) may appear in the gum margins that are somewhat inflamed by bacterial invasion—i.e., when hydrogen sulfide is produced locally—whenever the lead content of the involved tissues is sufficiently elevated. This occurs particularly when poor dental hygiene is present. Obvious deposits of lead sulfide are seen in the gums of persons with no demonstrable symptoms or signs of intoxication, but the development and extension of a lead line may be accepted as an indication of progressive lead absorption and thereby as a warning of danger. This line must be differentiated from those of other metallic sulfides (copper, bismuth, silver) and must not be confused with the normal pigment of Negroes and correspondingly dark-skinned peoples. The natural pigment is rarely found in the gum tissue on the lingual side, while a favored site for the first appearance of a lead line is in the extreme lingual edge of the gum opposite the bicuspids and lower molars.

Lead Intoxication

Absorption Is Not Intoxication

Lead is ubiquitous. Lead occurs in the body with no adverse effects. Toxic response depends on concentration. As increased amounts of lead are absorbed, quantitative values of lead in the blood, urine, and feces increase, qualitative changes occur in the blood (mild anemia and stippled cells) and urine (coproporphyrin), and a lead line in the gums may appear. Yet, none of these changes per se are signs of intoxication.

Types, Acute and Chronic

Lead intoxication is generally considered to be of two types, acute and chronic. The acute form is most often characterized by colic, but the signs and symptoms of persons who have been exposed to lead for brief periods are those more commonly associated with the chronic form of the disease. The acute type may therefore be recognized, but lead poisoning is usually chronic, as it is most frequently caused by gradual accumulation and storage of lead in the body. Sudden development of acute disturbances, however, may be similar in the two types of disease.

Early Signs and Symptoms

To define early or mild chronic lead poisoning accurately is extremely difficult and necessitates clear differentiation among absorption, damage to body tissues, and intoxication. The mild manifestations are so protean in character and develop so irregularly that differentiation between absorption and true intoxication is often nearly impossible.

Pallor of the skin, an ashen lead color of the face and pallor of the lips, is a fairly constant early sign. This grayish pallor is very characteristic of lead poisoning, but intoxication may occur without it. The previously discussed lead line of the gums occurs in approximately 2% of cases of poisoning. A diminished power to extend the wrists may be present. Associated symptoms are headache, indefinite weakness and lassitude, lack of appetite, nausea, constipation, metallic taste in the mouth, and halitosis. Workmen exposed to lead may frequently show no signs or early signs for a long time without any acute developments and then suddenly develop a toxic episode.

> In any group of people exposed to the hazards of lead absorption a limited number of cases of frank poisoning will result. In the remainder, however, signs of toxicity will not appear, the skeleton having successfully immobilized the major part of the absorbed lead. There is good evidence to suggest that many forms of acute stress can bring about release of this skeletal lead and give rise to symptoms of lead poisoning.[5]

Such stress may be injury, alcoholic excess, pneumonia, influenza, undernourishment, poor diet, even severe emotional upset.

Lead Colic

Smooth Muscle Involved

The most common (90%) and dramatic of the acute manifestations of lead intoxication (plumbism, saturnism) is colic. To most, this connotes severe intestinal pain, but any of the smooth muscles of the body may be affected.

The muscles of the bladder, ureters, testes, uterus, and cystic and common ducts may be involved. While the colic may be of various types, by far the most common manifestation is that which involves the intestinal tract.

Constipation

Acute attacks of colic are nearly invariably preceded by several days of obstinate constipation. During this preliminary period and the attack itself, there is often a desire to defecate; but there is usually complete inability to pass anything. The vomiting which occurs frequently with the onset of pain may be of brief duration or may persist. It usually contains bile, is green, frothy, and small in amount. Urine volume is diminished.

Signs and Symptoms

The patient while suffering from colic is cold, pale, and often drenched in perspiration. He commonly bends over and writhes about the bed in intense pain. He is restless between spasms because a sense of constant pressure persists. There is no localization, and patients characteristically spread both hands widely over the lower part of the abdomen when asked where the pain is. The abdomen is rarely distended, but is usually scaphoid in shape and held tensely and rigidly. Between cramps, it has a generalized doughy resistance, and there is no true muscle rigidity.

Diagnosis and Prognosis

Differential diagnosis is very difficult, as the symptoms and signs easily suggest some intra-abdominal catastrophe. A history of lead exposure as well as other evidence of lead poisoning helps in establishing the diagnosis. In itself, lead colic is not dangerous. Recovery is always fairly prompt and complete, though constipation tends to persist.

Lead Palsy

In 5% to 6% of cases, the striking manifestation is palsy. Usually colic has occurred or a general lassitude is present, accompanied by painful cramps or tremor of the muscles which are later involved. Sometimes, formication, numbness, or a dull ache, and very rarely hyperesthesia develop in plumbism.

Wristdrop

The most common form of palsy is the wristdrop and antibrachial paralysis. This may be limited to the extensor muscles of the middle and ring fingers at first, but usually the extensors of the index and little fingers are involved next and those of the thumb somewhat later. After the fingers are paralyzed, the wrist becomes weak. Paralysis affects all the muscles innervated by the radial nerve except the long supinator and anconeus. Lateral movement is thus difficult, and the hand is held in a characteristic position but somewhat toward the outer side of the arm. Swelling, due to accumulation of fluid in the hand, is common.

Brachial Palsy

Another type, very rare, usually involves the deltoid, biceps, anterior brachial, and long supinator muscles of the upper arm. This is termed brachial palsy and is usually associated with wristdrop.

Aran-Duchenne Palsy

A third form of palsy is the Aran-Duchenne type, in which there is progressive atrophy of the thenar and hypothenar eminences, the interosseus muscles, and the small muscles of the hand. This occurs alone or with a complication of wristdrop.

Foot Drop

Although infrequent, footdrop with "steppage" gait occurs. Muscles commonly affected are analogous to those affected in wristdrop, the lateral peroneal muscle, the common extensor of the toes, and the extensor of the large toe. Finally, paralysis may involve the diaphragm or larynx and cause death.

Diagnosis and Prognosis

Differential diagnosis must consider poliomyelitis, progressive muscular atrophy, amyotrophic lateral sclerosis, cervical rib, arsenic or alcoholic neuritis, and similar neurologic conditions. If further lead absorption is prevented, complete recovery usually occurs. The muscles first affected are usually the last to recover.

Lead Encephalopathy

Signs

Lead encephalopathy, while fairly common in children, very rarely occurs in adult workers in modern industry. There are prodromata of restlessness, general nervousness, mental depression, persistent headache, vertigo, faintness, transient paralysis, tremor of the hands, and tingling sensations. Then there may be generalized convulsion, coma, and often death.

Diagnosis and Prognosis

Differential diagnosis includes brain tumors, syphilis of the central nervous system, cere-

bral hemorrhage, chronic alcoholism, uremia, eclampsia, hysteria, and neuroses. Mortality varies from 25% to 75%. If the adult patient recovers, there are usually no sequelae.

Other Manifestations

Lead may also cause palsies of the eye muscles. There may also be damage of the optic nerve in association with encephalopathy. Arthralgia may occur in the joints and muscles of the extremities, more severely in the flexors than in the extensors and in the legs than in the arms. Differential diagnosis includes gout, arthritides, peripheral vascular disease.

> In our own experience and knowledge of the literature, we are led to believe that mere lead absorption without the symptoms of lead palsy or encephalopathy causes no permanent physical harm to the adult human. Further, apart from those rare cases of colic with short periods of acute disability, there is no increase in plant absenteeism or loss of work ability . . .[3]

Treatment

Resume

Lead, once absorbed into the blood stream, is distributed throughout the entire body. It is deposited with calcium in the long bones where it remains stored in equilibrium with body fluids. In the normal course of events, the lead is excreted in the urine or intestines, and a balance is achieved. As already noted, the normal person takes in 0.3 mg per day and rids himself of the same amount per day. With increased absorption, the body cannot rid itself so quickly, and the excess is deposited mainly in the bones. If this does not occur fast enough, toxic levels are reached in the blood and tissues, and symptoms of poisoning occur. If, over a period of time, lead is deposited in long bones and a period of stress occurs, increased quantities of lead may be released into the circulation and tissues again, and toxic manifestations may occur. The actual amount of lead in the body is not important; the blood and tissue levels are important.

Edathamil (ethylenediamine-tetraacetic acid; EDTA) and its salts are chelating drugs. Chelation is the term applied to the process whereby a ring-like structure is formed in which a special type of bonding (coordinate) takes place between some of the atoms that form the ring. A multivalent positive ion, such as lead or calcium, when incorporated in a ring complex or chelate no longer retains its ionic properties. A sequestering agent is a compound that reacts with multivalent positive ions and retains them in an un-ionized state in a water-soluble product. Edathamil and its monosodium and dissodium salts are both chelating and sequestering agents. When calcium is added, a chelate is formed; therefore, edathamil calcium-disodium is the calcium chelate of the disodium salt of the acid (edathamil).

To avoid the possibility of producing hypocalcemia, edathamil calcium-disodium is used. The administration of this compound results in removal of lead from the body fluid because lead replaces calcium in the ring, yielding the more stable lead complex. Since the lead is chelated and sequestered, it cannot exert its toxic effects and is rapidly excreted, 50% within the first hour, 90% within seven hours. The primary "de-leading" action is apparently accomplished by removing lead from the plasma and body fluids. The lead level falls as excretion proceeds . . . then subsequently may rise again as the lead in the skeleton comes into equilibrium with the body fluids again.

Dosage

The recommended maximum dose for intravenous administration for each 10 pounds (4.5 kg) of body weight is 0.17 gm per hour, 0.33 gm per day, or 1.67 gm per week. The drug should be given in a concentration not to exceed 3%, in isotonic saline or 5% dextrose solution. Maximum dose per course of treatment is 2.5 gm for each 10 pounds of body weight. Courses should be separated by intervals of seven days, and it is inadvisable to exceed two courses, until or unless analytical results show a failure of blood levels to diminish satisfactorily or to remain below dangerous concentrations. Dramatic subjective improvement has occurred in many cases shortly after institution of therapy. In other cases, however, additional time-proved methods such as administration of calcium gluconate have been necessary. The drug is most useful in the treatment of the acute phase of the illness. Its principal virtue, however, lies in its ability to expedite the elimination of potentially toxic quantities of lead from the body.[6]

Use

The routine use of edathamil as prophylaxis against the absorption of lead cannot be condoned. Toxic reactions may occur from use of the drug itself and, while such reactions are not frequent, this must be considered in evaluating its use in a particular instance. As has always been true in the past, prophylaxis can be achieved safely only by controlling the sources of exposure to lead by the application

of proper measures of industrial hygiene. Edathamil, by its action, speeds up a natural process. With no exposure or further absorption, the excess lead would, over a period of time, be excreted. The removal from lead areas in many cases would be adequate treatment and prophylaxis.

Prophylaxis

Medical

In lieu of *adequate engineering measures for control of lead exposure,* no medical measures should be recommended. In conjunction with adequate control measures, removal of affected persons from exposure, instruction in adequate diets and hygiene, rotation in jobs to cut down time spent by persons in jobs involving greatest exposure, and monthly qualitative blood and urine tests may all be undertaken.

Hygienic

Hygienic measures might include two or more changes of clothing per week; regular bathing from daily to biweekly depending on job assignment; before smoking and eating; washing of face and hands; prohibiting smoking and eating in production areas; daily issue of a clean respirator.

Psychological

Finally, the psychological aspects of this problem must be taken into consideration. A frank, all-the-cards-on-the-table . . . approach should lead to better cooperation on the part of all personnel and help in pinpointing lapses in working techniques that produce slight elevations in lead signs. No lead phobia developed in at least one plant that used this approach.[7] What is feared is the unknown. To be on top of a problem is to have no problem at all.

(The author's address is 4056 Amboy Road, Great Kills, Staten Island 8, N. Y.)

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Normal ingestion of lead 0.3 mg per day

NATIONAL REHABILITATION ASSOCIATION ANNUAL CONFERENCE

will be held at the

Whitcomb Hotel, San Francisco
October 2-3-4, 1961

Slogan for the Conference this year is "Rehabilitation—A Bridge to the Future." The keynote address will be presented by The Hon. Abraham Ribicoff, Secretary of the U.S. Department of Health, Education and Welfare. The remainder of the program will include addresses by other well-known persons in the field of rehabilitation. Medical and other persons with interests in rehabilitation are invited to attend the Conference. Those desiring further information should address their inquiries to Mrs. Margarete Connolly, Conference Chairman, 1362 Ninth Avenue, San Francisco 22, Calif.

Editorial

Action and Reaction

REPORTS just received from two widely separated parts of the country dramatically illustrate both a problem and its possible solution. Item 1 deals with a decision handed down by the Supreme Court of the State of Oregon, sustaining an award for a fatal attack of coronary occlusion in an employee who had made next to no physical effort at work when the occlusion occurred. Item 2 deals with an action by the General Assembly of the State of Tennessee, to make legal a written waiver of workmen's compensation rights for heart attacks or aggravation of heart disease.

Bennie C. Olson, powderman and jackhammer operator for an Oregon logging firm, reported for work one morning not feeling well.[1] Because of trouble with the motor on the air compressor that powered his jackhammer, Olson was not required to work. Instead, he reclined in apparent distress on the crew truck while a mechanic repaired the motor. After the motor was repaired, Olson climbed to the bed of the truck that bore the machinery and engaged the hand level clutch to start the compressor. He collapsed and died.

The widow failed to recover an award under the Oregon workmen's compensation law, but successfully brought action in the civil courts. The final point at issue, as usual, was one created by conflicting testimony of expert medical witnesses. The Supreme Court properly refused to decide between two opposed medical theories: on the one hand, that the minor physical exertion precipitated the coronary occlusion, and, on the other, that the disease process alone produced the final outcome.

This is a replaying of an old record. Physicians, not lawyers, are responsible for a pattern of decisions that makes employers increasingly reluctant to hire known cardiacs. If physicians will not solve this problem themselves it will be solved for them.

Tennessee is a state in which the workmen's compensation law has been most liberally interpreted with respect to heart disease. Until recently any unusual exertion at work during the 24 hours immediately preceding onset of acute coronary occlusion has been considered to be a contributory cause of the attack. The state now has moved from a position of extreme liberality to one of extreme conservatism.

The General Assembly in March of this year legalized waivers for new cases of heart disease among established employees and known cases of heart disease among applicants for jobs. Waivers may not be required of established employees for heart conditions existing at the time the amendment went into effect.[2] In his advocacy of the amendment, Mr. W. D. Baird, Speaker of the Senate, stated that its purpose was to increase the industrial opportunities of persons who were being excluded from employment because of heart disease. The amendment is short, and should be read in full:

> When an employee or prospective employee has a prior history of heart disease, heart attack, or coronary failure, or occlusion, he (employee) may be permitted to waive in writing compensation from his employer or future employer for claims growing out of an aggravation or repetition of such condition, such waiver to be evidenced by filing with the Commissioner of Labor of the State of Tennessee, a written instrument to which shall be attached a copy of a medical statement giving the prior history of such condition, and in all such cases claims for Workmen's Compensation benefits growing out of an aggravation or repetition of such condition by such employee or his dependents shall be barred.
>
> No employer shall require the execution of a waiver by any employee who is at work on the effective date of this Act unless such employee subsequently suffers a heart condition as defined herein.

This is one way to correct the abuse of workmen's compensation in heart disease claims, but it is not the best way. It is an overcorrection. It is the sort of reaction that will be repeated unless and until the physicians who go to court quit romancing the subject matter of heart disease and employment. The situation requires action, not reaction.

1. *Olson* v *State Industrial Accident Commission*, Oregon Supreme Court 6551, June, 1960.

2. An Act to Amend Section 50—1109 of the Tennessee Code Annotated, Public Chapter no. 339, Senate Bill no. 627.

Book Reviews

ARTHRITIS: GENERAL PRINCIPLES, PHYSICAL MEDICINE, REHABILITATION. Multiple Authors, edited by Edward W. Lowman, M.D. Price, $9.50. Pp. 292, with illustrations. Little, Brown and Company, 34 Beacon St., Boston 6, Mass., 1959.

By DEREK H. CROSS, M.D.

Dr. Lowman and 24 collaborating authors have brought together in this volume the most comprehensive study of the medical and physical treatment of the arthritides available to date. Part I contains chapters on the anatomy of the joints and the pathology of the various types of arthritis, as well as an extensive section on the clinical features and medical treatment of arthritis. Part II deals with physical medicine and rehabilitation treatment of arthritis. This includes chapters on the principles of physical medicine treatment, exercise programs, and the use of occupational therapy, including adaptive equipment. Mechanical aids such as crutches, wheel chairs, shoe corrections, cervical traction, and so on are discussed in detail.

One of the most important sections in this work deals with the psychological and emotional aspects of this problem. Clinicians are becoming aware that many of the forms of arthritis are physical expressions of a stress reaction and that patients with one or more of these diseases are usually emotionally immature, dependent personality types and are in need of much emotional support as well as psychiatric help.

Not usually found in such works are chapters discussing the various agencies that can help the physician in handling these difficult cases. Listed are the national and state agencies in the United States, Great Britain, and Canada. The need for job testing and vocational placement have also been discussed.

In all, this comprehensive work is a fine reference source for anyone dealing with the many vexing problems commonly met in treating arthritic patients. It is of value, not only to the medical profession, but also to those in the paramedical fields who actually spend more time with the patient than does the physician.

Dr. Cross is in charge of the Physical Medicine Section, Harmarville Rehabilitation Center, Pittsburgh, Pa.

THE NERVOUS SYSTEM. G. M. Wyburn. Price, $5.00. Pp. 194, with illustrations. Academic Press, 111 Fifth Ave., New York, N. Y., 1960.

By CHARLES M. POSER, M.D.

This book is designed to give an outline of the basic anatomy and physiology of the nervous system. Its specific purpose has been to integrate structure and function in such a way that it would be easily accessible to paramedical personnel, such as physical therapists, speech therapists, and others.

In this reviewer's opinion, the book has eminently succeeded in this by combining the traditional teachings of anatomy and physiology with the more recent advances. As a result, the book is a valuable if superficial compendium of present, well-established knowledge about the workings of the nervous system.

By using simple language, Wyburn has managed to explain briefly, clearly, and yet completely some of the basic mechanisms that must be understood, without citing burdensome and occasionally tedious experimental details. It is rather surprising to see how little space has been devoted to cortical function, since there is no discussion whatsoever of the various higher functions such as speech, auditory, and visual receptive areas.

There is a good short discussion of chemical regulation in the central nervous system, as well as one on the blood vessels and on the cerebrospinal fluid. In the latter chapter, the author states that most of the cerebrospinal fluid is formed from the choroid plexuses of the ventricles, in spite of the fact that there is a great deal of evidence showing that these choroid plexuses contribute only a portion of the fluid. A few errors have crept into the illustrations, such as the one showing the parietal lobe as situated anterior to the central fissure.

Each chapter is followed by a short but carefully selected and up to date bibliography.

In spite of the fact that this book is not primarily directed to medical personnel, medical students and general practitioners might find it most useful in refreshing their memory about the function of the nervous system.

Dr. Poser is Associate Professor of Medicine (Neurology) at the University of Kansas School of Medicine.

PROCEEDINGS THIRTEENTH INTERNATIONAL CONGRESS ON OCCUPATIONAL HEALTH. Published under the auspices of the U. S. Executive Committee of the Congress. Price, $7.50 to registrants, $10.00 to others. Pp. 1,005, with illustrations. New York, N. Y., 1961. Orders should be placed with Robert E. Eckardt, M.D., Secretary-General, Thirteenth International Congress on Occupational Health, Esso Research and Engineering Co., P. O. Box 45, Linden, N. J.

By CHARLES E. LEWIS, M.D.

Preparing a brief book review of this volume is similar to reviewing the first two or three volumes of the JOURNAL OF OCCUPATIONAL MEDICINE. For those who are interested in statistics this compendimum consists of 19 reports and 258 scientific or semiscientific papers. Of these, 207 are in English, while the rest are written in French, German, Spanish, or Italian.

The index of authors (as one would expect) reads like a Who's Who in International Occupa-

tional Health. The volume itself is full of many excellent papers, a few rather uninspired ones, and some which are reiterations of work already published by the authors. Among the papers of note is one by Bernard Goldstein, "Some Problems of the Doctor and Nurse in Industry." From a scientific standpoint the section on work physiology is probably the strongest group of papers.

This volume will be of interest to all those who attended the Conference and who, for obvious reasons, were unable to attend all of the sessions at which these papers were presented, and to all those who were unable to attend.

The book is extremely well reproduced and well organized. Its major deficiency is the absence of a subject index which would allow ready reference to particular topics of interest to the reader. Regardless of this deficiency, it stands as a striking tribute to the efforts of all those concerned with the organization and arrangements for the Thirteenth International Congress on Occupational Health, held in New York, N. Y., July 25 to 29, 1960.

Dr. Lewis is Associate Professor of Medicine (Preventive Medicine), University of Kansas School of Medicine, Kansas City, Kan. He is an Assistant Editor of this Journal.

SURGICAL PHILOSOPHY IN MASS CASUALTY MANAGEMENT. Warner F. Bowers, M.D., Ph.D. and Carl W. Hughes, M.D. Price, $6.75. Pp. 204, with illustrations. Charles C Thomas, Publisher, 301-327 E. Lawrence Ave., Springfield, Ill., 1960.

By M. N. HOWARD, M.D.

Persons with any experience in trying to stimulate interest among the profession in preparing and training for mass casualty management attending disaster situations are well aware of the apathy that greets this subject. To stimulate interest, perhaps the publisher should borrow a page from the pocket editions and have on the cover a lightly clad attractive blonde. Any means that would encourage the obtaining and reading of this volume would be justified, for it is an excellent presentation of the problems to be met and their solution in a situation where an overwhelming number of casualties require medical care.

The title is most appropriate. A dictionary definition of philosophy includes the following, "the study and knowledge of the principles that cause, control or explain facts and events; calm judgment and equable temper resulting from study of causes and laws; practical wisdom; fortitude; reasoned science." The practice of medicine as usual is impossible under disaster conditions, and physicians must reorient their customary professional habits to render even adequate care in an emergency environment. This volume is designed not for the surgeon alone but for all physicians who, faced with a disaster, will be called upon to perform duties far removed from their specialties.

The writing is clear and succinct and presents a definite program that is yet elastic enough to be tailored to the magnitude and the circumstances of any emergency.

The authors, Chief and Assistant Chief respectively of the Department of Surgery, Tripler U. S. Army Hospital, Honolulu, Hawaii, are excellently qualified to present the subject. They have participated in the detailed course that the Army has presented to its personnel as well as civilian groups in management of mass casualties. They have wisely abstained from trying to write a surgical treatise but have confined themselves to the problems of organizing and preparing for numerous casualties and the description and the management of the basic type of injuries to be expected. An excellent bibliography lists references for further study in the special fields the reader might wish to explore.

The chapters on Introduction and Common Sense Recognition of the Problem deserves especially close reading, and the picture presented is grim. "We must abandon such concepts as 'maximum care,' 'use of university hospital standards' and the thought that frills and niceties can be preserved." It must be realized that sufficiently trained personnel, equipment, and supplies will not be available under disaster conditions to treat casualties as we are accustomed to in our usual daily activities. It is hoped that this book will not be shrugged off as just another Civil Defense effort to cope with an atomic bomb. Although the latter situation is necessarily discussed, the authors have made this a manual dealing with the civilan tragedies—flood, fire, tornado, and explosion. Just the one paragraph on the proper use of a tourniquet, if carefully read, will save many a limb.

The chapters on Characteristic Effects of Trauma, Principles and Importance of Sorting, and Treatment Groups list clearly the basic principles to be understood and applied in saving lives. The Cost of Delayed Medical Care chapter explains well the rationale for the grim decisions that will have to be made.

Although there are chapters on chemical and bacteriological warfare and a section on radiation effects, these offer primarily background information. More space is judiciously devoted to the surgical compromises, the management of burns, the use of antibiotics, and the more common abdominal, thoracic, and fracture problems.

It would be well to reprint the chapter Lessons Learned from Civilian Disasters for distribution by the American Medical Association so that every practicing physician can be shocked out of the feeling that he can handle anything that comes along. The confusion and the errors that attended the reception of casualties from train wrecks, a bridge collapse, a tornado, and an airplane accident make for sober contemplation. "Clearly, we have not always done a good job in handling medical emergencies. It is important that the medical profession realizes this and further realizes that a peacetime medical emergency can occur any place."

The coordination of medical activities with non-

medical agencies could perhaps have been expanded into a short chapter defining more clearly the nonmedical but essential problems, such as communication and transportation, and their solution. An appended schematic organizational chart would be helpful.

This book is particularly recommended as an addition to every industrial medical department library as a ready reference manual. Industrial groups are more likely to be faced with emergency medical situations, and preliminary planning is essential. This volume would also serve as an excellent guide for safety and first-aid group discussions.

Dr. Howard is Medical Director, Research Department, Socony Mobil Oil Company, Inc., Brooklyn, N. Y.

Publications Available

The following list of publications has been compiled on the basis of probable interest to the readers of this Journal and is presented solely for the purpose of giving notice of their availability.

The Surgery of Mitral Stenosis. Robert P. Glover, M.D., and Julio C. Davila, M.D. Price, $9.50. Pp. 219, with 41 illustrations. Grune & Stratton, 831 Park Avenue South, New York 16, N. Y., 1960.

Health Statistics from the U. S. National Health Survey: Selected Health Characteristics by Area, Geographic Regions, and Urban-Rural Residence, United States, July 1957 to June 1959 series C, number 5, Public Health Service Publication No. 584-C5. March, 1961. For sale by the Superintendent of Documents, U. S. Government Printing Office, Washington 25, D.C.

This report is based on health interviews conducted in approximately 73,000 households and covering about 235,000 persons throughout the United States during the period indicated. Reports have been separated into four major regions of the United States, and there are selected statistics which relate to the prevalence of limitation of activity, disability days, chronic illness, injuries, and physician's and dentist's visits by geographic region and urban-rural residence.

Governor's Conference on Health Hazards in Uranium Mines. U.S. Department of Health, Education, and Welfare, Public Health Service Publication #843, Washington, D.C., 1961.

Letters

TO THE EDITOR: Here's one instance where the diagnosis of pityriasis rosea was made easy by an industrial worker.

A 22-year-old white boy, an employee in a textile mill, was referred for diagnosis of a possible occupational dermatosis. After he had removed his shirt, I remarked, "You have pityriasis rosea."

He said, "I know I have. The disease was first described by Gilbert in 1860."

"How do you know that?"

"I read all about it in a book in your front office."

"How did you find a description of that disease in the text book?"

"Well, I heard Dr. ——— (industrial physician) say something about rosea. I didn't remember the long first name. The first page I opened in the book (of the many texts on dermatology, he had removed the one by Milton B. Hartzell, 1917, page 112) I saw pityriasis rosea."

"Did you identify your eruption from the illustration (on page 114)?"

"No, from the description of the disease. I didn't see the illustration."

"How could you fit the description to your eruption?"

"Well, I think it was easy. If an animal is described as one with four legs, a long snoot and two tails, any child would recognize the animal when seen."

"Does the eruption bother you?"

"None whatsoever, but it does my wife."

"From what you read, you know it is not of occupational origin."

"I do, and also that it is not contagious and that will please my wife."

—JOSEPH V. KLAUDER, M.D.
1934 Spruce St.
Philadelphia 3, Pa.

Questions

The questions published in this column are edited versions of requests for information that have been received during recent months. The answers have been prepared by one or more competent authorities in the particular area covered by the question. Readers may address questions to the Editor.

QUESTION: *When should a mild to moderate effusion of the knee be aspirated following trauma?*

ANSWER: If there is suspicion of a bloody effusion, aspiration will assist in establishing the possible degree of injury to the joint. Any aspiration must be done under the strictest aseptic precautions because of the possibility of introducing organisms and creating a septic arthritis. Mild effusions, therefore, should probably not be aspirated, but treated with rest and hot compresses. Moderate effusions which are painful and which limit motion and do not respond rapidly to rest and application of heat may be carefully aspirated. Fluid obtained from such aspirations should be investigated by the laboratory. Frequently the introduction of Hydorcortone into the subacute or chronic traumatic synovitis will assist in lessening the inflammatory response and hasten recovery. The most important aspect of treatment remains judicious rest, the application of heat, and the early institution of progressive weight-resistance quadriceps exercises.

Abstracts of Current Literature

Internal Medicine

Early Use of Oxygen in Coronary Thrombosis. A. L. Barach,* E. R. Pons, Jr., and J. Berg. J.A.M.A. 174:1276 (Nov. 5) 1960. (*929 Park Ave., New York, N. Y.)

This study supports the theory that earlier use of oxygen than is now being practiced enhances the life-saving potential in patients with acute coronary thrombosis.

Keefer and Resnick suggested that oxygen want was the cause of anginal pain. Oxygen therapy is valuable and at times lifesaving in coronary thrombosis, cardiac insufficiency, shock, and severe anginal pain.

The authors have shown that oxygen inhalation, even 40% oxygen from a pocket dispenser, will increase arterial oxygen pressure by more than twofold. They stress the hazard of using nitroglycerin in acute occlusion, which physiologically may cause a fall in blood pressure and result in massive infarction and death. Oxygen has no such effects.

Twelve patients with coronary insufficiency breathed pocket-dispenser oxygen; the Master Two-Step Test was performed while the oxygen was breathed. In 11, the electrocardiogram abnormalities that had been previously induced by exercise were no longer present.

The authors conclude from their investigation that early use of oxygen in acute coronary thrombosis is indicated and may be lifesaving. The use of a portable oxygen apparatus for physicians and for ambulatory use by patients is discussed.

—S.H.S.

Paralytic Brachial Neuritis—Discussion of Clinical Features with a Review of 23 Cases. K. R. Magee* and R. N. DeJong. J.A.M.A. 174:1258 (Nov. 5) 1960. (*1405 East Ann St., Ann Arbor, Mich.)

This report is a study of 23 patients with paralytic brachial neuritis. The signs and symptoms are discussed. The features are consistent, thus enhancing recognition. There is a sudden onset of pain in either one or both shoulders, the side of the neck, and the upper arm. Hours or days after the onset, weakness of the shoulder girdle develops on the same side as the pain. Finally, paresis occurs and lasts for weeks or months, and paresthesias may persist longer or be permanent. The paresis is of the lower motor neuron variety, fasciculations being uncommon. The cutaneous sensory loss is mild compared with the severe motor involvement. The motor and sensory phenomenon may follow one or more peripheral nerves, nerve roots, or a combination of these.

Twenty-one of the twenty-three patients reported upon were male, ages varying from 8 to 64 years, most commonly from the 30- to 60-year age group. In only seven, could an antecedent illness be elicited. No patient had a recent injury to the neck or upper extremities, and none had a recent serum injection.

The condition must be differentiated from poliomyelitis, spinal cord tumor, herniated cervical disk, and amyotrophic lateral sclerosis.

Paralytic brachial plexus neuritis is not uncommon; the prognosis for recovery of function of the shoulder girdle muscles is good. The cause is unknown.

—S.H.S.

Treatment of Goiter and Thyroid Nodules with Thyroid. E. B. Astwood,* C. E. Cassidy, and G. D. Aurback. J.A.M.A. 174:459 (Oct. 1) 1960. (*171 Harrison Avenue, Boston, Mass.)

Most goiters and many tumors of the thyroid gland are due to excessive secretion of thyrotropin; thyroid therapy inhibits the production of thyrotropin; therefore, its use in simple goiter and thyroid nodules is logical.

Two hundred thirty cases were analyzed, and both simple goiter and thyroid nodules were either reduced in size or disappeared in two-thirds of the cases treated with thyroid U.S.P. Operation was performed on only two patients during 13 years of study; these were operated upon because of tracheal compression. Radioactive iodine was used in only a few cases with solitary nodules which did not respond to thyroid therapy.

The authors conclude that goiter is a benign process and that the prevalent fear of carcinoma is unwarranted. It is felt that inadequate treatment is responsible for nonregression in many cases and that favorable results often did not occur until 180 mg. of thyroid daily was given.

—S.H.S.

The Trampoline and Serious Neurological Injuries—A Report of Five Cases. W. G. Ellis, D. Green, N. R. Holzaepfel, and A. L. Sahs.* J.A.M.A. 174: 1673 (Nov. 26) 1960. (*Department of Neurology, University Hospital, Iowa City, Iowa)

Because untrained gymnasts (the general public) are adopting the recent fad of tumbling on the trampoline, the authors warn the medical profession of the hazards. The five cases described in this report adequately demonstrate disasters that may occur. These patients suffered extensive neurological damage; three patients developed quadriplegia, and one died. An analysis shows that the backward somersault causing acute neck flexion and spinal cord compression was the prime factor causing injury.

The authors suggest that local health departments establish a regulatory code for trampoline amusement centers. A training program under a qualified instructor is suggested especially before allowing participants to attempt either backward or forward somersaults. A restriction on exercise time is suggested; beginners should not use the trampoline more than one-half hour. The

patrons should be aware that critical neurological injury can occur by striking the springs or supports of the mat.

Six basic maneuvers for novices are outlined: (1) normal standing bounce; (2) knee drop; (3) hand and knee drop; (4) front drop; (5) seat drop; and (6) back drop. —S.H.S.

The Course of Retinopathy in Treated Malignant Hypertension. G. Lockhart, G. van Noorden, H. P. Dustan,* A. C. Corcoran, and I. H. Page. Arch. Int. Med. 106:205 (Aug.) 1960. (*Research Division, Cleveland Clinic, 2020 E. 93 Street, Cleveland 6, Ohio)

The degree of papilledema and the numbers of exudates in patients with malignant hypertension were found to reflect the relative severity of the vascular disease but not the severity of renal disease. Arteriolar constriction and sclerosis and numbers of hemorrhages were of no prognostic value.

Antihypertensive drug therapy produced favorable changes in the papilledema and exudates even when blood pressure control was poor. It is suggested that such therapy "controls" but does not cure the underlying vascular disease.—L.W.

Noise and Hearing

Influence of Intense "White" Noise on Auditory Function. A. A. Arkad'evskii.* Biophysics 4:41, 1959. (*Institute of Biological Physics, Academy of Sciences of the U.S.S.R., Moscow)

The author studied the effects of noise from a particular industrial situation on the perception of acoustic signals after the noise exposure. The over-all level of the industrial noise was 106 db, and the level per 1 cycle ranged from about 58 db to 65 db through the frequency range 100 to 7000 cps. A small number of subjects were used, and a single subject was used to demonstrate certain findings. The average hearing thresholds for the subjects (all industrial workers) were computed and compared with the average hearing thresholds of 2,000 young persons not exposed to industrial noise (obtained by another experimenter). The hearing thresholds of the industrial workers were elevated at all test frequencies (100, 200, 800, 2000, and 4500 cps). The maximum elevation was in the region of 3000 to 4500 cps and ranged from 17 to 29 db. Special comparisons show a 40-year-old worker with 25 years' experience to have a 49 db threshold elevation at 4500 cps. while a 40-year-old worker with 4 years' experience had a 25 db threshold elevation. The development of the hearing threshold elevation was studied over a six-hour period of work in the noise where it had been determined that the noise was on 96.5% of the time. At 200 and 800 cps, the threshold elevation was about 3 db in one hour and remained stable for the rest of the period. At 2000 cps, the hearing threshold increased during the first hour (to about 4 db), leveled off, and then increased between the fourth and sixth hours to about 6 db. At 4500 cps, the threshold increased to about 7 db during the first hour, remained steady for two hours, and then increased to 10 db by the end of the sixth hour. The author assumes the initial elevation of threshold is the result of effects on the end organ (inner ear), while the later elevation probably involves higher nervous elements as well. —H.O.P.

Effect of Background Noise on the Auditory Intensive Difference Limen. C. E. Sherrick, Jr.* J. Acoust. Soc. America 31:239 (Feb.) 1959. (*Washington University, St. Louis Mo.)

The effect of random background noise on the intensive difference limen (DL) for pure tones was studied to determine the influence of signal intensity, signal frequency, and S/N ratios on the DL and also the effect of psychophysical technique on these values. Three frequencies were studied: 250, 1000, and 400 cps at three sensation levels of 20, 40, and 60 db with S/N ratios of −1, −10, 0, and 10 db present for each condition. Results indicated that the S/N ratio was the only significant factor affecting the DL. When the experiment was repeated using the psychophysical method of average error, for a 1000 cps signal at levels of 10, 30, 50, and 70 db and at S/N ratios of −10, 0 10, and 20 db, no systematic shift of DL resulted. The curve which relates the DL obtained by modulation to S/N ratio appears to parallel that found in quiet when the difference limen is plotted against sensation level. The author proposes some hypotheses relating to the differences of psychophysical procedure.—R.G.H.

A New Method for the Clinical Determination of Sensorineural Acuity Level (SAL). J. F. Jerger* and T. W. Tillman. A. M. A. Arch. Otolaryng. 71: 948 (June) 1960. (*Northwestern University, Evanston, Ill.)

This study proposes a new method to measure sensorineural loss which eliminates some of the serious problems presented by classical bone conduction audiometry such as the inadequate calibration of bone conduction systems and the many variables that affect the bone conduction threshold in mild hearing losses. In this method, a thermal noise of fixed intensity is presented to the skull through a standard bone conduction oscillator mounted at the center of the forehead. The number of decibels by which this noise shifts the pure-tone air conduction threshold in a particular ear is subtracted from the shift produced by the same noise level in normal ears. The resulting number of decibels is called the sensorineural acuity level (SAL). In a study on 20 subjects with sensorineural losses, the method was found to compare very favorably in terms of both validity and accuracy with conventional bone conduction audiometry. The two important advantages of this new technique over conventional bone audiometry

are, first, the instrumentation can be calibrated with little difficulty and, second, the problem of cross hearing to the nontest ear is greatly minimized. —R.G.H.

Masking by Octave Bands of Noise in Normal and Impaired Ears. J. F. Jerger,* T. W. Tillman, and J. L. Peterson. J. Acoust. Soc. America 32:385 (March) 1960. (*Northwestern University, Evanston, Ill.)

The masking of pure tones by three octave bands of thermal noise at each of two effective noise levels was studied in six groups of normal and hearing-impaired ears (normal hearing, normal but with canals plugged with wax-impregnated pellets, bilateral otitis media, bilateral otosclerosis, elderly subjects with bilateral sensorineural loss presumably due to cochlear lesion). The results were essentially equivalent for all groups studied at either level for frequencies within the noise bands. For frequencies above and below the noise band, no differences among groups were noted at the 10 db effective level. At the 30 db effective level, both presbycusics and sensorineural losses of presumably cochlear origin showed more masking than either normals, plugged normals, or conductives. The authors conclude that the results of the present investigation fail to support the contention that the impaired ear can be differentiated in any way by the amount of masking shown in the presence of broad-band thermal noise at an equivalent effective level. —R.G.H.

Experimental Toxicology

Bioassay on Polyvinylpyrrolidones with Limited Molecular Weight Range. W. C. Hueper.* J. Nat. Cancer Inst. 26:229 (Jan.) 1961. (*National Cancer Institute, Bethesda, Md.)

A polyvinylpyrrolidone (PVP) of molecular weight range 2,000-38,000 and one of 4,000-80,000 were repeatedly injected intraperitoneally into rats and rabbits as 25% solutions in isotonic saline. The macromolecular portion of both samples was retained in the organs of rats, but the PVP of lower maximal molecular weight (38,000) passed through the glomerular filter of rabbits and thus was not stored. The glomerular filter of rats and rabbits differed in pore size. Despite the fact that PVP was retained in the tissues, no significant incidence of tumors was observed. This is interpreted as support for the theory that the carcinogenic effect of macromolecules is not related to physical properties. —R.E.E.

Myocarditis Produced by Allylamines: Experimental. R. J. Guzman,* G. S. Loquvam, J. K. Kodama, and C. H. Hine. Arch. Environ. Health 2:62 (Jan.) 1961. (*University of California School of Medicine, San Francisco)

Myocardial lesions could be produced consistently in rats and rabbits by exposure to monoallyl, diallyl, and triallyl amines and to bis(2-ethylhexyl)allyl amine. The lesions had both a vascular and a muscular component and could be produced in rats by repeated 7-hour vapor exposures at concentrations as low as 10-20 ppm and by single exposures of less than 24 hours to 40 ppm. There was considerable variation in response depending on species, route of administration, and physiologic or other stress. Suggested MAC's are 5 ppm for monoallyl amine and 20 ppm for diallyl and triallyl amines. The mono derivative has sufficient warning properties, but the other two do not. The lesions could not be produced with closely related amine analogues or with other allyl compounds. —R.E.E.

Toxicology of Mono- and Di-Isopropenylacetylene. L. Feinsilver,* S. Rothberg, D. E. Stabile, and E. J. Donati. Army Chemical Center, Maryland, PB-147683 (Feb.) 1960. (*Chemical Warfare Laboratories, Army Chemical Center, Maryland)

Intraperitoneal and intravenous injection studies and vapor inhalation exposures with monoisopropenylacetylene (IPA) and diisopropenylacetylene (DIPA) reveal that both compounds are eye irritants in liquid and vapor states, both are skin irritants as liquids but not vapors, both are respiratory irritants and are toxic to the central nervous system. DIPA exerts a toxic effect on the kidneys and may have significant cardiovascular effects. —R.E.E.

Observations on the Effects of Powdered Polymer in the Carcinogenic Process. E. T. Oppenheimer,* M. Willhite, I. Danishévsky, and A. P. Stout. Cancer Res. 21:132 (Jan.) 1961. (*Columbia University, College of Physicians and Surgeons, New York)

Tumor formation following subcutaneous implantation of polymer films is preceded by the development of a fibrous pocket, and the tumors originate in the lining cells of these pockets. Polymer powders have been shown to be noncarcinogenic by the same implantation technique. To test the hypothesis that powder might induce tumors if placed directly into a preformed pocket, polyethylene powder and glass powder were inserted into pockets preformed around embedded glass films, both with and without the presence of the film. Insertions were made between four and five months after embedding, during the reversible stage of film-induced tumorigenesis. There was no significant change in the incidence of tumors produced by the powders on the pocket cells. A foreign-body reaction was consistently seen with the imbedded powder. —R.E.E.

Some Effects of Epoxy Compounds on the Blood. J. K. Kodama,* and others. Arch. Environ. Health 2:50 (Jan.) 1961. (*University of California Medical Center, San Francisco)

Of the 13 epoxy compounds tested, the following induced no hemopoietic effects in rats: phenyl

glycidyl and *n*-butyl glycidyl ethers, glycidol, epoxy resin B, and mono glycidyl and diglycidylphenyl glycidyl ethers. Of the remainder, which ranged in activity between benzene and known potent radiomimetic drugs, five sharply decreased erythrocytes, one of which did not alter the leukocyte picture or decrease the number of nucleated marrow cells; six decreased the leukocyte count significantly; and four decreased the number of nucleated cells in the femoral marrow. It was possible for a compound to decrease the latter without decreasing the number of circulating leukocytes or vice versa. The other compounds tested were allyl glycidyl ether, *glycidyl aldehyde, butadiene dioxide, diglycidyl ether,* vinylcyclohexene dioxide, *triglycidyl phosphate,* and epoxy resin A. It is suggested that only those which produced their effect at a dose of less than 100 mg/kg intramuscularly (daily for two three-day periods) would constitute an industrial hazard from the radiomimetic standpoint and then only on exposure to intolerable, nearly lethal amounts; the compounds in this category are italicized above. Propylene glycol was included as the negative control. —R.E.E.

Effect of Feeding Butylated Hydroxyanisole to Dogs. O. H. M. Wilder,* P. C. Ostby, and B. R. Gregory. J. Agric. Food Chem. 8:504 (Nov.-Dec.) 1960. (*University of Chicago, Chicago, Ill.)

Groups of weanling dogs were fed butylated hydroxyanisole (BHA) at levels of 5, 50, and 250 mg/kg/day for 15 months to determine the effect, if any, of subacute levels on health. Weight gains in the different groups were essentially normal, although those animals at the highest dietary level ate less, probably because of the unpalatable taste of BHA at this high concentration. At the levels tested, there were no appreciable effects observed on hemoglobin level or cell counts. Higher-than-average glucuronate levels in urine were detected, and at 50 mg/kg and above there was a slight-to-considerable increase in the urinary total to inorganic sulfate ratios. Microscopic examination of tissues after autopsy failed to reveal any significant pathologic changes except in the dogs fed the highest level. In these animals, liver damage was seen. These studies indicate that dogs can ingest for long periods levels of BHA which are at least 220 times the level currently permitted (0.01%) in lard. —R.E.E.

The Respiratory Response of Guinea Pigs to the Inhalation of Acetic Acid Vapor. M. O. Amdur.* Am. Indust. Hyg. A. J. 22:1 (Feb.) 1961. (*Harvard School of Public Health, Boston)

Guinea pigs exposed for 1 hour to concentrations of 5-500 ppm of acetic acid vapor showed an increase in pulmonary flow resistance, a decrease in pulmonary compliance, and an increase in the time constant of the lungs. These changes suggest bronchial constriction as the primary action of this irritant. Concentrations above 100 ppm also caused a decrease in respiration rate and minute volume and an increase in the work of respiration. By-passing the upper airway with a tracheal cannula increased the response. A sodium chloride aerosol delayed the recovery but did not increase the magnitude of the response. (Author's summary.) —R.E.E.

Clinical Toxicology

Kerosene Pneumonitis Treated with Adrenal Steroids. R. L. Mayock,* N. Bozorgnia, and H. F. Zinsser. Ann. Int. Med. 54:559 (March) 1961. (*Pulmonary Disease Section, Hospital of the University of Pennsylvania, University of Pennsylvania, Philadelphia, Pa.)

A man accidentally ingested several mouthfuls of Ultrasene, a kerosene product, while at work. At least one mouthful was swallowed, and there followed choking and severe coughing, with some of the liquid coming out of the man's nose. Initial treatment consisted of the administration of magnesia magma and advice to drink plenty of liquids. Nausea and vomiting occurred six hours later, together with a feverish feeling, occasional dry cough, and shortness of breath. The next day the cough was worse and productive of about one-half cup of grossly bloody sputum. Pleuritic pain developed in the right side of the chest. When the patient was admitted (Aug. 31) to the hospital two days after the incident, he exhibited signs of a pneumonitis on the right side of the chest which was accompanied by fever. A chest x-ray film revealed extensive consolidation of the right middle lobe and the right lower lobe. The sulfobromophthalein test showed 41.7% retention after 45 minutes, serum transaminase elevations (30 units Sept. 6; 69 units Sept. 18), and elevations of the alkaline phosphatase. Initially, he was treated with penicillin and analgesics. A lung abscess developed, and prednisone therapy was begun, after which lysis of the temperature occurred promptly. The abscess cleared, and the patient was discharged on Sept. 30, although a considerable residuum was still seen in the x-ray film. Fever and hemoptysis developed again on Oct. 10, and steroid therapy (triamcinolone) was instituted; improvement followed. Residual changes in the x-ray film persisted, and the man was readmitted for study. Bronchiectasis of the right middle lobe was detected. He was discharged, but plans were made to readmit him for chest surgery. On Dec. 5, the right middle lobe was removed, and he made an uneventful recovery without residua.

In the remainder of the article, the authors review the effects produced by the ingestion of kerosene and cite a case of pneumonitis due to the aspiration of crude oil that responded to the administration of corticotropin and cortisone. Beneficial effects following the administration of steroids to three children who ingested kerosene are also cited. In the light of the results in the

case and others reported in the literature, the authors believe that adrenal steroids may prove useful in the treatment of toxic pneumonitis secondary to the inhalation or ingestion of kerosene or other related hydrocarbons. —L.H.M.

Surgery

The Subcuticular Suture. R. E. Straith,* J. M. Lawson, and C. J. Hipps. Postgrad. Med. 29:164 (Feb.) 1961. (*The Straith Clinic for Plastic, Reconstructive, and Hand Surgery, Detroit, Mich.)

Fine suture technique, particularly in the treatment of facial lacerations is important from the viewpoints of economics, surgical satisfaction, and patient happiness. Halsted's subcuticular technique, refined by Straith, is the treatment of choice in facial lacerations because of the absence of stitch marks, the hairline-scar end-result, and the freedom from depression or stretching.

Proper preoperative preparation is essential. The wound is thoroughly scrubbed with pHisoHex soap for at least five minutes for a distance of at least 15 cm around the wound. This is followed by aqueous benzalkonium (Zephiran) chloride solution and careful draping. Pentobarbital sodium (Nembutal) and meperidine hypdrochloride (Demerol) are used preoperatively. Lidocaine (Xylocaine) 1% with epinephrine hydrochloride (Adrenalin) solution (1:50,000) is used wherever feasible. Epinephrine is not used in the presence of cardiac disease or hypertension.

Skin incisions are made where possible in Langer's Lines. In the case of lacerations, where the direction has been predetermined, debriding of all skin edges must be done carefully, sharply incising and sacrificing about 1 or 2 mm of normal-appearing skin and allowing the skin edges to slightly overhang 90 degrees. Care must be exercised, as distortion may result from taking too much tissue from the side of an orifice. Excess fatty and subcutaneous tissues are carefully trimmed so that the desired eversion of skin edges is obtained. Scar spread is thus prevented as the healing tissues contract. Buried white "dimestore" nylon sutures placed 3 to 5 mm apart are used to approximate the deeper layers of the dermis in eversion. Intracuticular 4-0 or 5-0 monofilament nylon on an Atraumatic needle is used to better approximate and evert the skin edges. Bringing this suture out each ¾ inch facilitates removal in 10-14 days. Any area needing better approximation is handled with small interrupted sutures tied with the first half of a surgical knot and left in place 48 hours. "Dog-ears" are handled by removing small "darts" of skin and closing in a Y.

Gut or silk sutures should never be used on the face except in the mucous membrane of the oral and nasal cavities. Buried white Nylon rarely "spits" if it is more than 2 mm below the surface. If it does, it occurs through a small pore with minimal scarring. It should not be used in eyelids because it can be felt as little beads beneath the thin skin.

The final step in the proper handling of wounds is proper bandaging in order to protect the wound from contamination, prevent tension of the wound edges, supply enough pressure to minimize postoperative bleeding, and restrict motion. Collodion should never be placed directly on a wound since it can cause a chemical burn and interpose an impregnable layer between the healing wound edges. —E.M.

Laceration of the Liver from Closed-Chest Cardiac Massage. R. R. Morgan.* New England J. Med. 265:82 (July 13) 1961. (*St. Vincent's Hospital, New York, N. Y.)

This paper represents a case of hepatic rupture with intraperitoneal hemorrhage following the vigorous use of closed-chest cardiac massage. Although the patient did not have his heart resusciated, it is felt that the hemorrhage would have been fatal. Also, although the patient had been receiving heparin, the only evidence of hemorrhage was from the extensive, deep lacerations of the liver. —E.M.

External Cardiac Massage. J. R. Baringer, E. W. Salzman, W. A. Jones, and A. L. Friedlich. New England J. Med. 265:62 (July 13) 1961. (*Massachusetts General Hospital, Boston, Mass.)

This paper emphasizes the complications that may ensue from the use of closed-chest cardiac massage. It is a comprehensive review of 84 consecutive cases in which closed-chest cardiac massage was employed for any reason. The emergency nature of this catastrophe frequently limits the adequate recording of clinical data. The procedure was employed on all types of patients, including those with arrest in the operating room or emergency ward, myocardial infarction, congestive heart failure, pneumonia, brain stem hemorrhage, pulmonary embolism, dissecting aneurysm, and terminal disease. The number of survivors leaving the hospital was small, reflecting the nature and extent of the underlying disease.

Of particular interest are the complications discovered at postmortem examination performed on 46 patients in the series. Rib fractures were found in 15 cases (33%) and involved two to eight ribs. Hemothorax which was found in four cases (9%) was probably secondary to rib fractures. Hemopericardium was discovered in two cases (4%). Liver injury of varying severity was present in five cases (11%). Bone marrow emboli, primarily in the pulmonary arteries, were discovered in six cases (13%).

The authors feel that the complications in no way detract from the usefulness of the procedure, but they must be considered when nonmedical personnel are instructed in its use. The

frequency of complications is reduced as experience is gained. —E.M.

Results of Anterior Excision of Ruptured Cervical Discs. R. M. Stuck.* Am. Surg. 27:469 (June) 1961. (*1825 Gilpen St., Denver, Colo.)

In 1959, Stuck presented a preliminary report on the anterior excision of ruptured cervical intervertebral discs and interbody fusion. The present article summarizes the follow-up of those cases and adds cases in which he has used the procedure since that time. One hundred cases have been analyzed for simple statistical data, and seventy-five cases have been analyzed for clinical results.

The operative approach is through the anterior neck, as opposed to the older approach of a posterior laminectomy. Patients are selected for surgical treatment only after a minimum of three months of conservative treatment without improvement. The only exceptions to this rule are those with severe fracture dislocations of the cervical spine and those with acute unilateral disc rupture with symptoms referable to a solitary nerve root. Also, any cases selected for surgery have to have one or more deranged discs demonstrated by discogram, and the procedure of discography must reproduce the symptoms present in the orginal pattern. In the analysis of the author's series 76% of 67 patients have been returned to gainful employment. The author strongly recommends this surgical approach to cervical intervertebral discs. —A.A.B.

Dermatology

Eczematous Contact — Sensitivity to Gold. J. M. Fox,* R. Kennedy, and A. Rostenberg, Jr. Arch. Dermat. 83:956 (June) 1961. (*Department of Dermatology, University of Illinois College of Medicine, 840 S. Wood Street, Chicago 12, Ill.)

Eczematous contact sensitivity to gold salts is rare but is said to occur among photographers. Patients reacting to metallic gold probably dissolve a small fraction in their sweat. Histopathology is atypical in that acantholysis is present, but this may indicate a toxic rather than an allergic reaction. —M.M.K.

Photosensitivity Due to Pitch. K. D. Crow,* E. Alexander, W. H. L. Buck, B. E. Johnson, I. A. Magnus, and A. D. Porter. Brit. J. Dermat. 73:220 (June) 1961. (*The Princess Margaret Hospital, Swindon, Wiltshire, United Kingdom)

In an outbreak of photosensitization due to pitch, the manifestations were smarts (intense smarting and burning sensations usually associated with erythema), melanosis, and photophobia. Another factor in hyperpigmentation was retention of pitch by the skin, presumably in the pilosebaceous follicles. Comedones were observed on the ears and face and folliculitis on the thighs. Indians and Negroes were apparently not affected by photosensitization.

Abstracts

The action spectrum for pitch, as determined by a monochromator, was in the region 340-430 μ. To protect against light of this wavelength, a physical sunscreen such as zinc oxide could be used, but this would be unacceptable to most factory workers. In addition to exhaust ventilation, use of a solvent-containing waterless hand cleanser followed by thorough washing with soap and water was recommended. —M.M.K.

Demethylchlortetracycline Phototoxicity. S. Saslaw.* New England J. Med. 264:1301 (June 22) 1961. (*Department of Medicine, Ohio State University College of Medicine, Columbus, Ohio)

Photosensitization was experienced by a physician who had been taking demethylchlortetracycline. Manifestations included smarting, erythema, edema, pruritic vesicles, and hyperpigmentation.

It is estimated that 3% to 6% of patients taking demethylchlortetracycline develop phototoxicity. Most reactions occur during the summer months. —M.M.K.

Photodermatitis Due to Tetrachlorsalicylanilide. D. S. Wilkinson.* Brit. J. Dermat. 73:214 (June) 1961. (*Aylesbury Hospital, Aylesbury, Buckinghamshire, United Kingdom)

Tetrachlorsalicylanilide (TCSA), a bacteriostatic agent, in an English toilet soap was responsible for 53 cases of photodermatitis, many of them industrial. The action spectrum was not determined. The pathogenesis was difficult to explain because patch tests with low concentrations of TCSA were positive without provocation by ultraviolet radiation. —M.M.K.

Human Anthrax in New York State. J. K. Miller.* New York J. Med. 61:2046 (June 15) 1961. (*Division of Laboratories and Research, State of New York, Department of Health, New Scotland Ave., Albany, N.Y.)

The distribution of agricultural anthrax in New York State is about the same as it was 50 years ago, but the incidence of bovine anthrax has been markedly reduced by vaccination.

Previously tanneries and carpet mills were the foci of industrial anthrax. Now cases predominate in industries using goat hair imported from Pakistan, Iraq, Iran, and India.

Between 1943 and 1960, there were 109 cases of anthrax in humans reported in New York State. Except for one case of fatal bacteremia in a laboratory worker and a fatal case of meningitis, all cases were the cutaneous form of anthrax. Forty percent of the primary cutaneous lesions occurred on the lower arm and hand; 33% were located on the face; and 16% were on the neck. All cases were diagnosed initially by stained smear, and the majority of cases were confirmed by culture or animal inoculation. Since 1945,

all patients have been treated with penicillin, supplemented by sulfonamide therapy when the primary lesion was on the head or neck. —M.M.K.

Medical Care Administration

Tropical Medicine Today. T. H. Weller.* New England J. Med. 264:911 (May 4) 1961. (*Boston, Mass.)

Thinking of tropical medicine as a collection of "exotic" entities tends to perpetuate a misleading concept of the health problems of the tropics. The magnitude, importance, and nature of the challenge posed the health professions by the mass misery of people in the developing areas of the world are insufficiently appreciated. The ignorance of such matters by educators and scientists is attributable in part to the peculiar intellectual provincialism and specialism characteristic of the present time.

As a consequence of increasing pressure on medical curriculums, the teaching of classical tropical medicine has been deemphasized: yet many young physicians will work at some time in tropical areas, and all will have contact with patients who have been in the tropics.

New legislation should establish a career corps of specially trained and selected persons to work in international health. Fellowship programs for foreign students should be reorganized with emphasis on the health needs of the country and capacity to utilize the special skills acquired. There is a need to channel limited resources carefully into preventive activities.

The effectiveness of this nation in contributing to the attack on mass poverty and illness and the rapidity with which it acts may well determine whether contemporary society and its academic freedoms will survive. —A.B.

The Fight for the Health Care Dollar. C. E. Silberman.* Hospitals 3:34 (Feb. 1) 1961. (*Board of Editors, Fortune Magazine, New York)

By 1970, three American families in four will have incomes of more than $4,000 per year, the point at which discretionary income begins. Two families in five will have incomes of more than $7,500 a year. The growth of the $7,500 and higher income group as the dominant income class will revolutionize the consumer market with an explosive widening of discretionary spending.

According to economic theory, as their income rises consumers will spend a rising share on luxuries like recreation, just as they spend a declining share on necessities like food, but our statistics show this has not been true. The percentage that goes for fun has remained stable since 1953. The outlay for health care, education, and personal business has been taking a steadily rising share of the consumer's dollar, and personal savings have been running at a consistently high rate.

Health care is becoming increasingly an item of discretionary spending. Since 1947, consumers have increased their outlays for health care much faster than their income, from 4.5% of their income to 5.6%. The rise in net spending for health and hospital insurance—premiums less claims—has been even sharper, having nearly tripled. This sharp rise stems largely from the fact that Americans have been demanding and receiving a higher standard of health care. One of the ways they have been exercising their growing discretionary income has been to buy a standard of health care above the subsistence level. High standards seem to generate a demand for even better care. So do higher incomes and better education. Chances are that by 1970 consumers will be paying out twice as much on health care as they are now.

How much consumers actually spend on health care will depend, in large measure, on what Blue Cross and the commercial insurance companies have to offer. If the cost of health care continues to rise faster than the cost of other goods and services, the consumer may decide to forego some health "luxuries" in favor of a more comfortable house or a more frequent vacation. The tremendous rise in educational levels makes it highly likely that consumers will place a steadily rising value on health care regardless of price—within limits. —A.B.

Radiation Health

Histologic Studies of Neutron and X-Irradiated Mouse Lenses. T. C. Evans,* R. D. Richards, and E. F. Riley. Radiation Res. 13:737 (Nov.) 1960. (*Radiation Research Laboratory and Department of Ophthalmology, College of Medicine, State University of Iowa, Iowa City, Iowa)

The lenses of groups of mice were exposed to a range of single or fractionated doses of neutrons and x-radiation, and the histological changes were compared. Radiation cataracts developed in two stages. First, there appeared to be damage to the lens epithelium. The resultant histological changes appeared as (1) disorganized lens bow pattern, (2) abnormal fibers in the cortex, (3) undifferentiated (pseudoepithelial) cells in the subcapsular position migrating from the equator toward the posterior pole, (4) accumulation of debris and abnormal cells at the poles of the lens. At low doses, the changes stopped at this stage. At higher dosage, cataracts developed which involved all the structures within the capsule. As the lens became completely opaque, degenerative processes included those fibers formed prior to irradiation and sometimes even the lens nucleus.

The damage produced by neutrons appeared to be qualitatively no different from that produced by x-rays. When cataractogenically equivalent doses of neutrons and x-radiation were employed, the rate of change was also the same. When x-rays administered in a single dose at the rate of 31 rads per minute (1,100 rads in 35 minutes) were

compared with neutrons given in a single dose (215 rads in 30 to 45 minutes), the relatively biological cataratogenic effectiveness of the neutrons was about 5. The cataractogenic effectiveness of x-rays was markedly reduced by fractionation, however, while that of the neutron radiation decreased very little with fractionation. —W.D.N.

Evaluation and Management of the Heavily Irradiated Individual. V. P. Bond,* T. M. Fliedner, and E. P. Cronkite. J. Nucl. Med. 1:221 (Oct.) 1960. (*Medical Research Center, Brookhaven National Laboratory, Upton, Long Island, N. Y.)

Therapeutic management of the patient exposed to ionizing radiation should be based on the clinical picture and not on physical dosimetry. Radiation exposure should not be considered an extreme emergency, since days and even weeks will pass before a need for therapy is established in the intermediate exposure ranges. The bone marrow depression seen from 9 to 35 or more days after exposure presents the most challenging therapeutic problem. The time and need for therapy are related to the rapidity of onset and the severity of depletion of peripheral blood elements. The presence or absence of nausea and vomiting and the extent of total lymphocyte decrease are the primary evaluation factors in the first few days. With severe bone marrow depression in the third or fourth week following exposure, a gratifying therapeutic response is possible by use of functional replacement therapy, with antibiotics, transfusions of fresh blood and/or fresh platelets. The efficiency of bone marrow transfusions in man has not been established as yet, but such transfusions should be considered seriously when complete marrow aplasia occurs in the second week or earlier. —G.L.V.

Radiation Protection. S. Warren.* New England J. Med. 264:705 (April 6) 1961. (*Pathology Department, Harvard Medical School, Boston, Mass.)

The commonest form of radiation to which man is exposed is diagnostic x-rays. The only effective guide for control of medical and dental uses of x-rays is the judgment of the physician or dentist, since there are no federal or local rules governing patient exposure. Great improvements have been made in recent years in reducing medical x-ray exposure by the use of smaller fields, harder radiation, more sensitive film, and image amplification.

The permissible occupational exposure levels have been reduced through the years as the means of detecting radiation effects have improved, the lack of positive evidence that low-level radiation doses are harmless has been recognized, the increasing number of potentially exposed populations has been noted. The original concept that a threshold dose must be exceeded to produce radiation injury has been replaced by the assumption that all radiation may be harmful. Therefore, the present concept of permissible doses introduces judgments which weigh the risk of harm against the benefits from allowing exposure to radiation. The exposure to radiation is being handled in conservative fashion in both medicine and industry. The ill effects should be minimal and the benefits great. —G.L.V.

Industrial Hygiene Controls

Recent Welding Practices at Naval Facilities. C. P. Bergtholdt.* Arch. Environ. Health 2:257 (March) 1961. (*U. S. Naval Weapons Plant, Washington D. C.)

In this article, the author reviews the effects of some of the recent changes in welding methods on the environmental exposures to toxic metal fumes and toxic gases associated with naval welding practices. In addition, he mentions the potential hazards from such sources as high-frequency, electron-beam, and ultrasonic welding. In connection with short-arc and dip-arc welding, the author states that "little or no postweld cleanup is required, with a resultant decrease in noise from chipping and grinding and a decrease in the amount of respirable grinding dust dispersed." In connection with electron-beam welding with energy potentials ranging from 5 to 150 kilovolts, welders should be provided with suitable radiation monitoring devices. Arc-spot welding leaves an irregular surface with a metal build-up or a button, the chipping and grinding of which causes additional noise, vibrations, and dust which are unwelcome. Ultrasonic welding is mentioned, during which ear protection is recommended until safe energy and frequency limits have been established. Foil seam welding is mentioned as providing health advantages from the reduction of noise, dust, and oxidant gases. Magnetic-force welding permits welding on coated steels and prefinished materials with no damage to the finish due to shallow heat penetration. Plasma jet coating with metallic elements may produce metal fume fever when inadequate ventilation is provided.

Standards for local exhaust ventilation are reviewed. Welding on cadmium-plated pipe legs is discussed as is the hazard from grinding the cadmium-plated tubing to remove the plating. The author also indicates the necessity for clearly identifying cadmium-plated materials and recommends that other less toxic corrosion-resistant coatings be utilized where available.

Mention is made of the possibility of inhalation of toxic vapors from the burning of the bulkhead plate backed by foamed-in-place plastic polyurethane plastics. The presence of toluene diisocyanate is not substantiated by chemical analysis of atmospheric concentrations. Twenty-one employees reported for treatment for symptoms including coughing, shortness of breath, and respiratory wheezing. Both air-supplied respirators and exhaust ventilation of at least 1,000 cu. ft./

min. through a 6-inch hose are recommended for this cutting operation. Organic vapor respirators are suggested for any other personnel in the area.

The author reports complaints resulting from the torch cutting of steel which had been coated with epoxy resin primer, particularly where the coating had not been ground away from the cutting or welding area. Also, complaints were investigated of effects from welding fumes from inert-gas aluminum arc-welding. Welders working in confined or semiconfined spaces should be provided with half-mask air-supplied respirators to be worn under their helmets as well as protective creams for protection against the strong ultraviolet radiation. Associated and assisting tradesmen are instructed to wear metal fume respirators. Potential health hazards from a proprietary product used to clean aluminum are discussed. Secondary butanol in addition to 4% butyl cellosolve and 2% acidic material were considered to be the active ingredients producing both respiratory and skin hazards.

Samples taken during silver brazing operations with a fluoride flux were positive for fluoride. Use of iron powdered electrodes produces much visible fume, but fewer flourides. Lastly, mention is made of alpha particles during inert-gas shielded welding with thoriated tungsten electrodes containing 1% and 3% thorium. Although significant activities were obtained by direct measurement, maximum total activity did not exceed the Atomic Energy Commission limit of 70 disintegrations per minute per cubic meter.

—E.C.R.

Environmental Physiology

Effect of Environmental Temperature on the Physiologic Cost of Muscular Work. L. Brouha,* P. E. Smith, Jr., M. E. Maxfield, and G. J. Stopps. Proceedings, Thirteenth International Congress on Occupational Health, 1960, p. 857. (*Haskell Laboratory, E. I. du Pont de Nemours & Company, Wilmington, Del.)

Man is the best tool to determine the effect of work stress and heat stress upon himself. Heart rate and body temperature are useful criteria of physiologic cost imposed on men working at various rates under hot conditions. Total number of heart beats above the resting level is described as the "cardiac cost" and may be measured during work and recovery or only during recovery. Recovery cost ("cardiac debt") is a sensitive indicator of physiologic strain.

Work output in the heat can be significantly increased with less time required for recovery by providing a cooled recovery room for rest between work periods. Thus, the cardiac cost was essentially the same but work output was 67% greater in men working 25 minutes in the heat and resting 10 minutes in a cool environment as compared with men performing work at the same rate for 15 minutes in the heat and spending 20 minutes for recovery in the same hot environment. Physiologic cost can also be decreased and work output increased by providing workers with air-cooled garments. Adding a man to the work crew reduces physiologic cost of heavy work requiring several men when the external heat load cannot be reduced by other means.

—D.M.

Ergonomics in Occupational Health Programs. G. C. E. Burger.* Proceedings, Thirteenth International Congress on Occupational Health, 1960, p. 864. (*Netherlands)

In its present phase of development, occupational medicine seeks not merely acceptable conditions of work but, instead, optimal. Historically, occupational medicine has been more concerned with environmental hazards that may lead to injury or illness rather than with the work load and its short- and long-term effects on the worker. Ergonomics, a word coined since World War II, is defined as the application of biologic knowledge in the fields of anatomy, physiology, and occupational medicine to the study of work, done in gainful employment, with the purpose of achieving a good balance between work load and work capacity through the optimal use of human working power and capabilities, in the interest of the health and dignity of man. Relief from all stresses is not its goal, since underloading as well as overloading may be deleterious to the worker. Instead, the goal is to promote optimal adaptation of man to his work. In this endeavor, the industrial physician is in a position to play a key role.

—D.M.

Technical Protection Measures Against Heat Radiation. H. J. Bordes,* J. T. G. Erhardt, W. Schermerhorn, and W. Van der Velden. Proceedings, Thirteenth International Congress on Occupational Health, 1960, p. 850. (*Netherlands)

Workers can be protected against radiant heat either by protective clothing or by screening the source. The latter procedure is the subject of this paper. The emission coefficient (=1 minus the reflection coefficient) is given for each of a number of metals and nonmetals with various surface characteristics. A radiant screen absorbs and also reflects incident radiation from the source, the total heat exchange by radiation following the law of Stefan-Boltzmann. The screen then acts as a secondary heat source, losing the heat it absorbs by convection and radiation. There is good agreement between calculated and observed values of heat transfer by radiation and convection for reflective and nonreflective screens separated by an open air space from radiant heat sources with surface temperatures up to 1,200°C. Optimum protection is obtained by combining two or more reflective screens separated by air spaces. For example, by using one iron screen next to the source followed by two reflective aluminum screens with open air spaces between each, intensity of the secondary radiation was only 0.02% of that emitting from the source.

—D.M.

About the Authors

► PHILIP E. ENTERLINE, Ph.D., is author of the article in this issue "Work Loss Due to Illness in Selected Occupations and Industries." He has 20 previous publications, dealing mostly with evaluation of public health programs and with epidemiologic studies of tuberculosis and heart disease.

Dr. Enterline received a bachelor's degree from Westminster College, New Wilmington, Pa., in 1942. He then served in the U.S. Army for three years. After discharge in 1945 he began a career with the U.S. Public Health Service as a statistician. At the same time he attended American University, Washington, D.C., from which institution he received the M.A. in statistics in 1954 and the Ph.D. degree in sociology in 1960.

Dr. Enterline began his work in the U.S. Public Health Service as Statistician, Tuberculosis Control Division. He moved successively to Assistant Chief, Division of Chronic Disease and Tuberculosis; then to Chief Statistician, Heart Disease Control Program; and to Chief, Morbidity and Health Statistics Branch, Division of Public Health Methods. In June of this year he transferred to his present position in the Division of Occupational Health.

► LAWRENCE E. HINKLE, JR., M.D., is senior author of the article in this issue, "The Continuity of Patterns of Illness and the Prediction of Future Health." He is an associate professor of clinical medicine as well as associate professor of clinical medicine in psychiatry at Cornell University Medical College, New York, N. Y., positions he has held since 1956. He is Executive Director of the Study Program in Human Health and the Ecology of Man at that institution and Consultant in Medical Research to American Telephone and Telegraph Co. and to Time, Inc.

Dr. Hinkle holds an A.B. degree from the University of North Carolina, Chapel Hill, N. C., and received the M.D. degree from Harvard Medical School, Boston, Mass., in 1942. After an internship at Peter Bent Brigham Hospital, Boston, he entered the U.S. Navy, serving in large part as Assistant Medical Officer, USS *Indiana*. He then served a residency in internal medicine at New York Hospital, where he is now an assistant attending physician. He is a member of a number of societies concerned with clinical research, the Society of Sigma Xi, and IMA; and he is certified by the American Board of Internal Medicine.

► NORMAN PLUMMER, M.D., is coauthor of the article in this issue, "The Continuity of Patterns of Illness and the Prediction of Future Health." He received the A.B. degree from the University of California and the M.D. degree from Cornell University Medical College, New York, N. Y. He entered private practice in New York City and carried out investigations on pneumonia and other contagious diseases at Bellevue and New York

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*Glaser, J.: Ann. Allergy 18:510 (May) 1960.

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Asthma

About the Authors

hospitals. He served in the U.S. Army from 1943 to 1946, during which time he participated in research on influenza and other acute respiratory diseases. For a part of this period, he was Assistant Administrator of the Army Epidemiological Board. At the present time, he is an assistant attending physician at the New York Hospital and an assistant professor of clinical medicine at Cornell University Medical College.

For a number of years, Dr. Plummer served as Medical Consultant to the American Cyanamid Company. For some time, he has been General Medical Director of the New York Telephone Company, New York, N. Y. He is a fellow of IMA and is certified in occupational medicine by the American Board of Preventive Medicine.

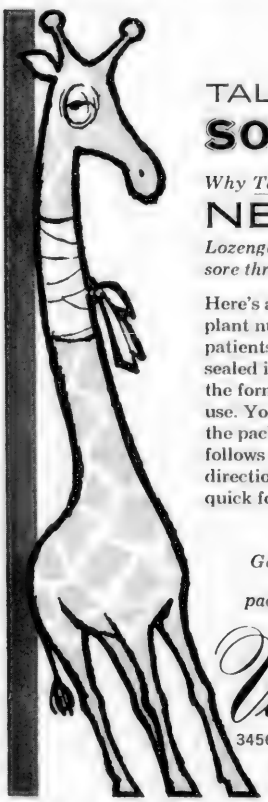
► S. D. STEINER, M.D., is author of the article in this issue, "Management Health Examination Program in General Motors." He was named Medical Director for General Motors Corporation in December, 1958, following 14 years as a plant physician and divisional medical director with the company. He began his career as county public health officer at Wellsburg, W. Va., after graduation from Northwestern University Medical School with an M.D. degree in 1938. In 1940 he received a master's degree in public health from Harvard University. He entered the U. S. Public Health Service in 1941 and in 1942 was named Director of Industrial Hygiene for the Maryland State Health Department.

Dr. Steiner joined General Motors in 1944 as a plant physician with Cadillac Motor Car Division, Detroit, Mich., and in 1946 became Medical Director of Oldsmobile Division, Lansing, Mich., the position he held prior to his present appointment. He is certified in occupational medicine by the American Board of Preventive Medicine. He is a member of the American Academy of Occupational Medicine and a fellow of the Industrial Medical Association.

► HOMER L. SKINNER, JR., M.D., began his medical career at the age of 18 when he served as a surgical technician in the U.S. Army, this service continuing for a period of three years (1943-1946). Shortly thereafter, he received the B.A. degree from Ohio University, Athens, Ohio, and the M.D. degree from Western Reserve University, Cleveland, Ohio. This was followed by an internship at University Hospitals, Cleveland, and a residency in general surgery at the U.S. Veterans Administration Hospital, Des Moines, Iowa.

Dr. Skinner entered practice in general surgery at Staten Island, N. Y., in 1957. In addition, he serves as medical officer to two firms: Nassau Smelting and Refining Company and S. S. White Dental Manufacturing Company. He is a diplomate of the American Board of Surgery, and he has earlier publications on surgical topics. His article in this issue is "The Lead Problem, an Outline of Current Knowledge and Opinion."

—EDITOR



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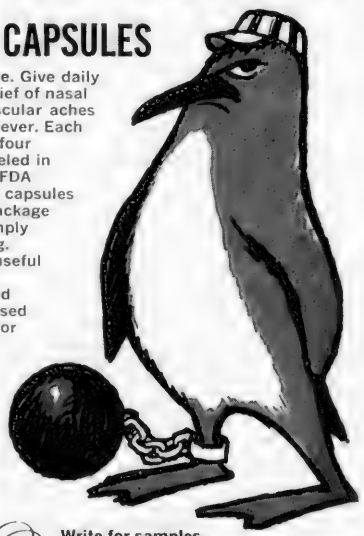

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People and Events

► WILBUR J. HARLEY, M.D., has been appointed Medical Director of the Western Electric Company's Omaha Works which employs about 4,400 persons in the manufacture of switching equipment and cable for the Bell Telephone System. The appointment became effective August 1.

DR. HARLEY has been associated with the Bell System since June, 1958, serving as Medical Director of the New York Telephone Company's Manhattan-Bronx-Westchester division and later as Assistant Medical Director of the American Telephone and Telegraph Company.

DR. HARLEY graduated from The Jefferson Medical College of Philadelphia in 1950. After completing his internship and residency at the Lancaster (Pa.) General Hospital, he spent five years in practice at Royersford, Pa.

In 1955, DR. HARLEY accepted an Atomic Energy Commission Fellowship in Industrial Medicine at the Kettering Laboratory, University of Cincinnati, where he completed the requirements leading to the degree of Sc.D. in Industrial Medicine. The third year of residency training was spent with the American Cyanamid Company in New York, Connecticut, and New Jersey.

He is a member of the American Medical Association, the Industrial Medical Association and the American Academy of Occupational Medicine. He is a Diplomate of the American Board of Preventive Medicine, certified in occupational medicine.

James Ryan, M.D.

► JAMES RYAN, M.D., joined the Standard Oil Company of California on August 7 as Assistant Medical Director. He will be located at the corporate home office in San Francisco.

Until his present appointment, DR. RYAN was Chief Physician for Convair (Astronautics) Division of General Dynamics Corporation in San Diego. He received his M.D. degree from St. Louis University School of Medicine in 1940 and served his internship at St. Joseph's Hospital in St. Paul, Minn. He was in the general practice of medicine and surgery in Milaca, Minn., from 1942 to 1946 and in St. Paul from 1946 to 1951. During this period in St. Paul, he did part-time industrial work for several industries. He became full-time staff physician for Convair-San Diego Division in 1951 and in 1956 transfered to Convair Astronautics.

DR. RYAN is a Fellow of the Industrial Medical Association, a member of the Board of Directors of the Western Industrial Medical Association and a member of the Occupational Health Committee of the California Medical Association.

Russell A. Barnhardt, M.D.

► RUSSELL A. BARNHARDT, M.D., became Chief Physician at the Ford Motor Company Trim Plant in Highland Park, Mich., on July 17, succeeding GORDON R. KNAPP, M.D., who has retired.

DR. BARNHARDT took his premedical training at Allegheny College and the University of Pittsburgh and received his M.D. degree from the University of Pennsylvania in 1932. He served his internship at Western Pennsylvania Hospital in Pittsburgh, served one year as a resident in Women's Hospital, New York City, then entered private practice in Pittsburgh. From 1941 to 1946 he was a Flight Surgeon in the U.S. Air Force and is now a Lieutenant Colonel in the Air Force Reserve. In 1946 he became Industrial Physician for the DuPont Company in New Jersey, and in 1952 he joined the Hercules Powder Company as Industrial Physician. He remained there until 1959 when he returned to private practice in Sayreville, New Jersey. He is a member of the American Medical Association, Aerospace Medical Association, Civil Aviation Medical Association, and Pan-American Medical Association.

► L. E. HAMLIN, M.D., who has been Medical Director of the American Brake Shoe Company since 1941 retired on August 1 and is making his home in Vulcan, Mich.

DR. HAMLIN graduated from the University of Toronto Medical School in 1922 and served his internship and was a resident in surgery at Henry Ford Hospital in Detroit. His first industrial position was that of Physician-in-Charge of the medical services for Ford Motor Company in Iron Mountain, Mich. From 1929 to 1941 he was Physician for the Penn Iron Mining Company in Norway, Mich.

During DR. HAMLIN'S 20 years with American Brake Shoe, the company has grown to include 55 plants in 23 locations throughout the U.S. and Canada. The Medical Department, located in Chicago, supervises the company's 41 industrial nurses. Among notable accomplishments, the Medical De-

About the Authors

partment has carried out specific investigations involving a clinical. roentgenological and industrial hygiene study of foundry cleaning-room employees and experimental investigation of the pulmonary reaction following the inhalation of dust generated by foundry cleaning-room operations.

DR. HAMLIN is a Fellow of the Industrial Medical Association and was a Director from 1947 to 1949. He was Chairman of the Committee on Tuberculosis in Industry for the National Tuberculosis Association and the American Trudeau Society from 1946 to 1949. He was a member of the Council on Industrial Health of the American Medical Association from 1952 to 1955. He is a member of the Ramazzini Society and a life member of the American College of Surgeons. He has written some 30 papers on occupational diseases of the chest which have been published in various medical journals.

Wanted

Copies of the January and April, 1960, issues of the JOURNAL OF OCCUPATIONAL MEDICINE are needed to complete volumes for a number of libraries. Anyone having extra copies of these issues is requested to send them to the Publication Office, JOURNAL OF OCCUPATIONAL MEDICINE, 55 East Washington, Chicago 2, Ill.

► CARL A. NAU, M.D., has joined the Department of Preventive Medicine and Public Health of the University of Oklahoma Medical Center, Oklahoma City, as Professor and Director of a newly created Institute of Environmental Health. He assumed his new position on August 15. He has been Professor and Chairman of the Department of Preventive Medicine at the University of Texas Medical Branch in Galveston since 1941.

DR. NAU received his B.A. and M.A. degrees from the University of Texas and his M.D. degree from Rush Medical College, Chicago, in 1933. He was Associate Professor of Physiology at the University of Oklahoma from 1933 to 1936. He then went to Texas and was in charge of the industrial health activities of the state Industrial Health Department for several years before joining the University of Texas.

He is a Fellow of the Industrial Medical Association, a member of the American Public Health Association, the American Industrial Hygiene Association and is certified in occupational medicine by the American Board of Preventive Medicine. He is a member of the editorial board of the *Archives of Environmental Health*.

► COL. ALVIN F. MEYER, JR., Chief of the Strategic Air Command's Bionucleonics and Environmental Health Branch, has left the Office of the Command Surgeon, Offutt Air Force Base, Nebraska, to attend the Industrial College of the Armed Forces at Ft. McNair, Washington, D.C. His departure ended a seven year assignment at Offutt.

COL. MEYER, an industrial hygiene engineer, has received national recognition as an expert on nuclear fallout and radiation hazard. A SAC handbook prepared by him "Peacetime Nuclear Weapons Accidents," is one of the few publications on this subject approved by the Department of Defense, the Atomic Energy Commission, and the United States Public Health Service. He presented a paper at the Los Angeles meeting of the Industrial Medical Association last April on "Potential Nuclear Hazards in U.S. Air Force Operations." This paper will appear in a future issue of the JOURNAL OF OCCUPATIONAL MEDICINE.

► DONALD H. ROBINSON, M.D., has been appointed Chief of the newly established Section of Industrial Health of the Panama Canal Company. The industrial health program includes medical care not only for employees who are engaged in all phases of industrial work, but for their dependents as well.

DR. ROBINSON received his medical degree from Hahnemann Medical College, Philadelphia, in 1945

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and the Master of Public Health degree from Johns Hopkins University in 1951. He is a member of the Industrial Medical Association, the American Medical Association and a Fellow of the American Public Health Association.

► ELLSWORTH F. MARRINER, M.D., has been appointed Medical Director of Autonetics, A Division of North American Aviation, Inc., succeeding STUART D. WHETSTONE, M.D., who has returned to private practice.

Prior to this appointment, DR. MARRINER served as Medical Director of Riverside California Division of Rohr Aircraft Corporation. He received his M.D. degree from University of Buffalo Medical School in 1948 and served his internship at Edward W. Sparrow Hospital, Lansing, Mich.

DR. MARRINER served two tours of duty with the U.S. Navy, one during World War II and the other during the Korean War. He first started in industrial medicine with the Ford Motor Company as a staff physician in the Buffalo Stamping Plant and later became Plant Physician of the Chicago Stamping Plant of the Ford Stamping Division. He is a member of the Western Industrial Medical Association and a Fellow of the Industrial Medical Association.

Ellsworth F. Marriner, M.D.

William L. Donham, M.D.

► WILLIAM L. DONHAM, M.D., joined the Lima Engine Plant of the Ford Motor Company on July 3 as Chief Physician. Until his present appointment he was on the staff of the Middlesboro Memorial Hospital, Middlesboro, Ky.

DR. DONHAM received his M.D. degree from the Indiana University School of Medicine in 1942. From 1943 to 1945 he was an interne and resident at the Methodist Hospital in Indianapolis. He was in private practice through 1954 and spent the next two years on the staff of the Veterans Administration Hospital in Popular Bluff, Mo.

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*Edelstein, A. J.: Pennsylvania M. J. 62:1831 (Dec.) 1959.

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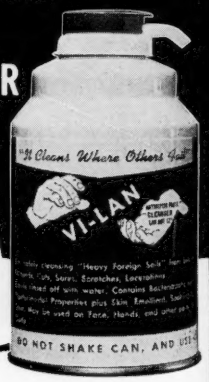

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At right, Dr. William P. Shepard speaking at the luncheon meeting of the New York State Society of Industrial Medicine on June 29. Seated, left to right, are Drs. Gradie R. Rowntree, Harry Tebrock and Leon Warshaw. The luncheon was given to honor the appointment of Dr. James H. Sterner as Chairman of the Council on Occupational Health of the American Medical Association.

► J. R. ALBRECHT, M.D., has been appointed Chief of Medical Services, American Steel and Wire Division, U.S. Steel Company, Joliet, Ill. Until his present appointment he was Medical Director of the Alan Wood Steel Company, Conshohocken, Pa.

DR. ALBRECHT graduated from the University of Pittsburgh School of Medicine in 1935 and served his internship at St. Joseph's Hospital in Pittsburgh. For the next six years he was Resident Physician at the Pittsburgh City Home and Hospital in Mayview, Pa. From 1943 to 1950 he was in private general practice in Vincennes, Ind. He then became Associate Medical Director at Hahnemann Medical College and Hospital of Philadelphia. From 1957 to 1959 he served as Medical Director of the American Federation of Labor Medical Service Plan of Philadelphia. He is a member of the Industrial Medical Association, the American Medical Association, and the American Public Health Association.

► HAROLD Y. ALLEN, M.D., has been named Medical Director for the Allegany Ballistics Laboratory of the Hercules Powder Company in Cumberland, Md. For the last year he has been with the Pontiac Motor Division of General Motors Corporation in Pontiac, Mich.

DR. ALLEN graduated from Jefferson Medical College of Philadelphia in 1953 and interned at Jefferson Hospital. He did postgraduate work in industrial hygiene at the University of Michigan. In 1957 he became Medical Director of the Buick-Oldsmobile-Pontiac Assembly Division of General Motors in Kansas City, where he remained until 1959 when he was appointed Medical Director of the New York, New Haven & Hartford Railroad in New Haven, Conn. He is a member of the Industrial Medical Association, the American Medical Association and is a diplomate of the National Board of Medical Examiners.

► LEE D. CADY, M.D., Manager of the Houston Veterans Administration Hospital, Houston, Tex., has been selected to receive the Physician's Award of 1960 which is presented annually by the President's Committee on Employment of the Physically Handicapped to the physician who has contributed the most to the program. The Award is an illuminated scroll with an appropriate inscription over the signature of the President of the United States. It will be presented to DR. CADY at the annual banquet of the Congress on Occupational Health of the American Medical Association in Denver, Colo., October 3.

The Veterans Administration Manager was recommended for the award by ROBERT A. WISE, M.D., Assistant Chief Physician, Humble Oil and Refining Company, Houston, and LAURENCE R. MELTON, Chairman of the Texas Governor's Committee on Employment of the Handicapped.

DR. CADY was graduated from Washington University School of Medicine, St. Louis, in 1922 and has been manager of the Houston VA Hospital since 1949. He is a member of the American College of Physicians and is certified by the American Board of Internal Medicine and is a diplomate of

The New England Industrial Medical Association met at the Yankee Atomic Electric Company in Rowe, Mass., on July 19. At left, Charles Keenan, Vice-President of Yankee Company is shown addressing the meeting. At right are Drs. James I. Roberts, John L. Norris and Frank LeBaron.

the National Board of Medical Examiners.

► LLOYD M. FARNER, M.D., has been named Commissioner of Health for the Arizona State Department of Health in Phoenix. For many years he was head of the Section of Industrial and Adult Hygiene for the Washington State Department of Health in Seattle.

DR. FARNER received his M.D. degree from the University of California School of Medicine in 1936 and served his internship at the Southern Pacific Railroad Hospital in San Francisco. He is a Fellow of the Industrial Medical Association and a member of the American Public Health Association, the American Medical Association and the American Conference of Governmental Industrial Hygienists.

► MRS. W. G. THUSS was named President-Elect of the Woman's Auxiliary to the American Medical Association at the 38th annual meeting of the Auxiliary in New York City in June. She has just completed a term as First Vice-President and Membership Chairman of the Auxiliary, and has previously served as President of both her county and state auxiliaries. She is the wife of WILLIAM G. THUSS, M.D., Director of the Thuss Clinic for occupational medicine and surgery in Birmingham, Ala. He has been a Fellow of the Industrial Medical Association for 20 years and has held numerous committee appointments.

► E. W. BULLARD has been elected President of the Industrial Safety Equipment Association, national organization of manufacturers and distributors of industrial safety equipment. MR. BULLARD is President of the E. D. Bullard Company of Sausalito, Calif. In recent years he has served as chairman of the San Francisco chapter of the American Society of Safety Engineers, and he was the first chairman of the Northern California chapter of Veterans of Safety. He is a member of the California Governor's Safety Council and the President's Conference of Occupational Health.

► Northwest Association of Occupational Medicine will hold its annual meeting on September 10 at the Hotel Multnomah in Portland, Ore. Scientific presentations on the program are as follows: "Improved Case Work for Injured Worker (For Nurses Only)"—Mrs. Emily Logan, Commissioner, Oregon State Industrial Accident Commission, Salem, Ore.; "Prevention of Blindness Due to Glaucoma"—Robert Zeller, M.D., Ophthalmologist, Portland; "Experience in Control of Air Pollution"—James Hammond, M.S., Chief Industrial Hygienist, Humble Oil and Refining Co., Houston, Tex.; "Human Injury from Air Pollutants"—John R. Goldsmith, M.D., Director, Air Pollution Studies, California Board of Health, Berkeley; "Resistance of Venereal Pathogens to Antibiotics"—Warfield Garson, M.D., District Health Officer, Allegheny County, Pittsburgh, Pa.; "The Plant Medical Program: Community Impact"—James P. Hughes, M.D., Medical Director, Kaiser Aluminum and Chemical Corporation, Oakland, Calif.; "Natural History of Coronary Artery Disease"—Marvin Schwartz, M.D., Cardiologist, Portland; "Restarting the Heart"—Marvin Lacy, M.D., Thoracic and Cardiac Surgeon, Portland; "Prediction and Employment after Cardiac Damage"—Wayne Rogers, M.D., Internal Medicine, Portland; "Discussant"—William Hurst, M.D., Internal Medicine, Portland; "Restoration for Return to Work"—Calvin Kiest, M.D., Orthopedic Surgeon, Portland.

THE FIFTH ANNUAL

WESTERN INDUSTRIAL HEALTH CONFERENCE

will be held

October 6 and 7, 1961

at the

Biltmore Hotel, Los Angeles, California

People and Events

► An all-day meeting on compensable heart disease will be conducted on October 21 by the Council on Community Service and Education of the American Heart Association as a part of the AHA's annual meeting in Miami Beach.

At the morning session, two papers on "Legal Factors in Compensable Heart Disease" will be presented, as follows: "Background of the Workman's Compensation Law" by L. Whiting Farinholt, and "Workman's Compensation Laws and Heart Disease" by Harold F. McNiece. A report of Dean McNiece's nationwide study of this problem appeared in the February, 1961, issue of this Journal (p. 64). Also at the morning session, four papers on "Medical Factors in the Determination of Compensability for Heart Disease" will be presented: "Physiological Aspects—Trauma, Physical and Emotional Stress" by Herman K. Hellerstein; "Pathological Factors" by Milton Helpern; "Clinical and Medical Considerations" by Sidney Scherlis; and "The Medical Problem of the Insurer" by Albert A. Pollack.

A mock trial demonstrating the medico-legal problems in the determination of possible compensable heart disease will be presented in the afternoon. Participants will be Max R. Israelson, Irving Cypen, Craig Spangenberg, William X. Geoghan, Jr., Herman K. Hellerstein and Sidney Scherlis.

► Minnesota Academy of Occupational Medicine and Surgery has elected the following officers: President—EARL T. OPSTAD, M.D.; Vice-President—LYMAN B. CLAY, M.D.; Secretary—LEONARD ARLING, M.D.; Treasurer—ALBERT T. HAYS, M.D.; Recorder—DONALD OSBORN, M.D.

Deaths

EUGENE P. OWEN, M.D., Portland, Ore., on July 29; Medical Director, Western Area Consolidated Freightways, Freightliner Corp., West Coast Steamship Co.; Medical Consultant, Standard Oil of California and the Carnation Company; M.D. degree, Harvard School of Medicine, 1929; past-President, Oregon Academy of Occupational Medicine; past-President, Northwest Association of Occupational Medicine; Industrial Medical Association member, 1955, Fellow, 1959.

CHARLES L. ROMAN, M.D., Valleyfield, Quebec, on June 8; Consultant for Dominion Textile Company, Ltd., and other industries; M.D. degree, McGill University, 1919; Industrial Medical Association member, 1947, Fellow, 1953.

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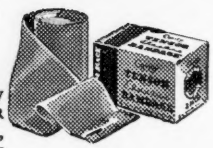

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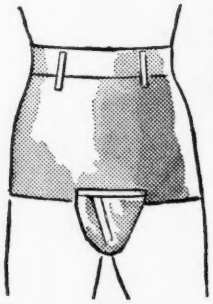

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